ERASMUS UNIVERSITY ROTTERDAM
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Master Thesis Strategy Economics

Mergers vs Demergers on Sustainability

Can a Corporate Restructuring Strategy improve a firm's ESG Score via innovation?

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Abstract

Firms are facing many pressures to become more sustainable. This Master Thesis tries to determine with various empirical methods and by analysing 302 EU-listed firms (2010-2019) whether a merger or demerger strategy through innovation has a comparatively better effect on firm sustainability, proxied by several ESG measures. This Master Thesis concludes that a Corporate Restructuring Strategy indeed can improve a firm's ESG Score.

Preface

My experience during my internship at Eneco Ventures and an SDG Student Challenge with EY prompted me to write my Bachelor's thesis titled, "Can sustainability be bought? The role of Corporate Venture Capital Strategy on Firms achieving their ESG Goals". It was an analysis of a Corporate Venture Capital Strategy on the sustainability of European firms proxied by ESG Score. For my master's thesis, I wanted to dive deeper into this topic: I wanted to research merger and demerger strategies from an innovation perspective, specifically, whether a corporate restructuring strategy can improve a firm's sustainability. Therefore, I am grateful that I had the opportunity to supplement my academic work by writing my master thesis within the Enterprise Risk department at EY. Finally, I want thank my thesis supervisor Professor Pennings for his wonderful guidance.

Abbreviations

ATT	Average Treatment Effect on Treated
CSRD	Corporate Sustainability Reporting Directive
ESG	Environmental Social Governance
M&A	Mergers & Acquisitions
R&D	Research and development
SFDR	Sustainable Finance Disclosure Regulation
SMEs	Small and Medium-sized Enterprises
Staggered DiD	Staggered Difference-in-Difference

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1. Introduction

One of the greatest challenges of the 21st century is changing the way humans and firms treat the planet and its resources (Nordhaus, 2019). The negative externalities arising from the status quo, such as climate change, pollution and draining natural resources, need to be addressed and solved to ensure viable life on the planet in the future (Tol, 2018). This belief is not a new call to action, but a worry echoed before by concerned academics, activist NGOs, and conscious consumers. Still, most firms have not started incorporating sustainability concerns into their corporate strategies until recent years (HBR, 2022). In addition, firms also try to address social sustainability issues: diversity, gender equality, and human rights. In Europe, social issues (46%) are even seen as more concerning than environmental issues (39%) and governance issues (12%) (Hood,2022).

External pressures

Firms have traditionally focused on financial and shareholder returns. Nevertheless, conversely, firms have realised that consumers demand sustainable products. The firms initially responded by offering consumers sustainability-marketed products, mainly sold at a significant price premium (Forbes et al., 2009). Unfortunately, these early alternatives were often "greenwashed" products, a marketing ploy. However, the initially small group of sustainable consumers has become an influential and vocal group that demands genuinely sustainable products and services from firms (SB Insight AB, 2021). Activism has also been organised into groups like Milieudefensie and Engine No. 1 (Hiller et al., 2021). As a result, the growth of sustainability-marketed products has outpaced the growth of non-sustainable in 90% of all global product categories (Abu-Shakra, 2021).

Moreover, investments in firms with sustainability-based business models can lead to lower downturn risks and higher returns than other firms (Schramade, 2016). Thus, investors expect firms to gear up more toward sustainability-based models. As a result, investors have developed frameworks like the ESG Framework that integrate sustainability within their investment rationale and valuation models (Amel-Zadeh & Serafeim, 2018). Even though the relationship between sustainability and financial performance is not strictly linear, the initial ESG integration costs need to be recuperated first (Cappucci, 2017). Still, according to an EY study, 96% of surveyed investors, sustainability information plays a key role in their investment decisions (Nelson, 2018).

Regulators such as the European Commission and SEC also impose more responsibilities on firms to address sustainability issues and disclose their actions (Drolet et al., 2021). The European Union aims to become climate-neutral by 2050 through the EU Green Deal, which includes the Corporate Sustainability Reporting Directive (CSRD), EU Taxonomy, and the Sustainable Finance Disclosure Regulation (SFDR), all introduced in January 2022 (European Commission, 2019). In addition, national governments are also accelerating regulation for firms through measures like green taxes, plastics bans, and minimum wages, albeit forced by litigations from activist organisations like Urgenda (NRC, 2019). Lastly, the COVID-19 pandemic has acted as a catalyst for even greater integration of sustainability into investor decision-making and firms' corporate strategy (Nelson, 2021). More precisely, 84% of the respondents of an EY Survey say that COVID-19 has increased the expectations of stakeholders on the sustainability of the firm (Teigland et al., 2022).

These external pressures have thus led firms to start integrating sustainability matters within their corporate strategy, stakeholder capitalism— by committing to go carbon net-zero, using more recycled inputs, and creating more long-term value in the near future.

Internal pressures

Employees nowadays also demand more from their employers regarding commitments to the firm's sustainability, "doing well by doing good"(Acaroglu, 2020). Mission-driven employees can strengthen their firm's brand and increase productivity (Edmans, 2012).

Previous academic literature has also established the importance of sustainability in a firm's existential objective of profitability (Reinhardt, 2000; Lozano et al., 2015; Scoop, 2021). Two notions support this finding. Firstly, firms exist to seek profit and seek profits to exist. Secondly, to some extent, firms need to be sustainable to exist and stay existing, as increased sustainability can improve financial firm performance and thus profitability. Moreover, it follows that firms often need to innovate to increase their sustainability (Jakobsen & Clausen, 2016). Namely, innovation is an essential contributor to new technologies and practices in firms (Schumpeter, 1912). Even though many strategies can increase a firm's sustainable innovation and thus sustainability (Bowonder et al., 2010), in this master thesis, two distinct corporate strategies will be looked at in-depth and empirically compared against each other vis-à-vis: Merger Strategy vs Demerger Strategy. As they are two opposing extremes, they both partly encapsulate intermediate strategies.

This sustainability dilemma led to the formulation of the following research question:
Can a Corporate Restructuring Strategy improve a firm's ESG Score via innovation?

Thus, questioning explicitly whether an established firm should choose a strategy that changes its corporate organizational structure by focusing more on mergers or demergers, when it aims to increase its sustainability, as measured by ESG Score? Namely, to successfully attain this goal, firms need a high level of innovation (Klewitz & Hansen, 2014). One could argue that firms need to accumulate various resources to innovate (Yang et al., 2010). Hence, an established firm could grow through mergers and acquisitions (gather resources), innovate, and consequently increase its sustainability. Alternatively, one can argue that a conglomerate, a large diversified firm with a complex corporate structure, can find it more challenging to align its different entities to focus on implementing a set strategic goal (Verma & Sharma, 2019). Perhaps a leaner firm may be significantly better at enhancing a firm's strategic focus on innovation and sustainability.

Sustainability

Sustainability has until now been used in the thesis as a quite unelaborated term. However, according to Reinhardt (2000), who conducted a systematic review of corporate sustainability literature, there are two definitions for sustainability at the firm level. These two definitions distinguish themselves from the macroeconomic definitions.

Firstly, firm sustainability is defined from a social-cost perspective: a net positive result from the traditional profit equation, total assets minus total costs. However, in this case, cost centres are measured at their social opportunity cost (Reinhardt, 2000). Social cost adjusted asset depreciation differs from the market priced depreciation. Social costs include negative externalities, such as air pollution, deforestation and resource depletion (Reinhardt, 2000). The modified profit equation thus combines economic and environmental performance into the determination of the definition of firm sustainability. Secondly, firm sustainability can also be defined from a private-cost perspective. In this context, the value created by the firm is probed by the shareholders and corrected for private-market costs. Private costs, in this case, are formed by adhering to market forces and governmental regulations (Reinhardt, 2000). For instance, fair labour wages and ethical financing. Still, more attention has also started being set on sustainability's social and governance aspects in recent years (Hood, 2022). Thus, the definition has broadened.

ESG Score

An ESG score assesses a firm's or an investment's level of sustainability with non-financial information distinguished in Environmental, Social and Governance dimensions (Eccles & Stroehle, 2018). The acronym, ESG, was first coined in the 2005 "Who Cares Wins" report of the UN and the World Bank (Li et al., 2021). **E**nvironmental aspects are contributions to greenhouse gas emissions, waste management and energy efficiency. **S**ocial factors include human rights, labour standards, and workplace health and safety. Lastly, **G**overnance relates to rules and principles of how the firm's board make decisions (Henisz et al., 2021). This thesis will use ESG Score as a proxy for a firm's sustainability.

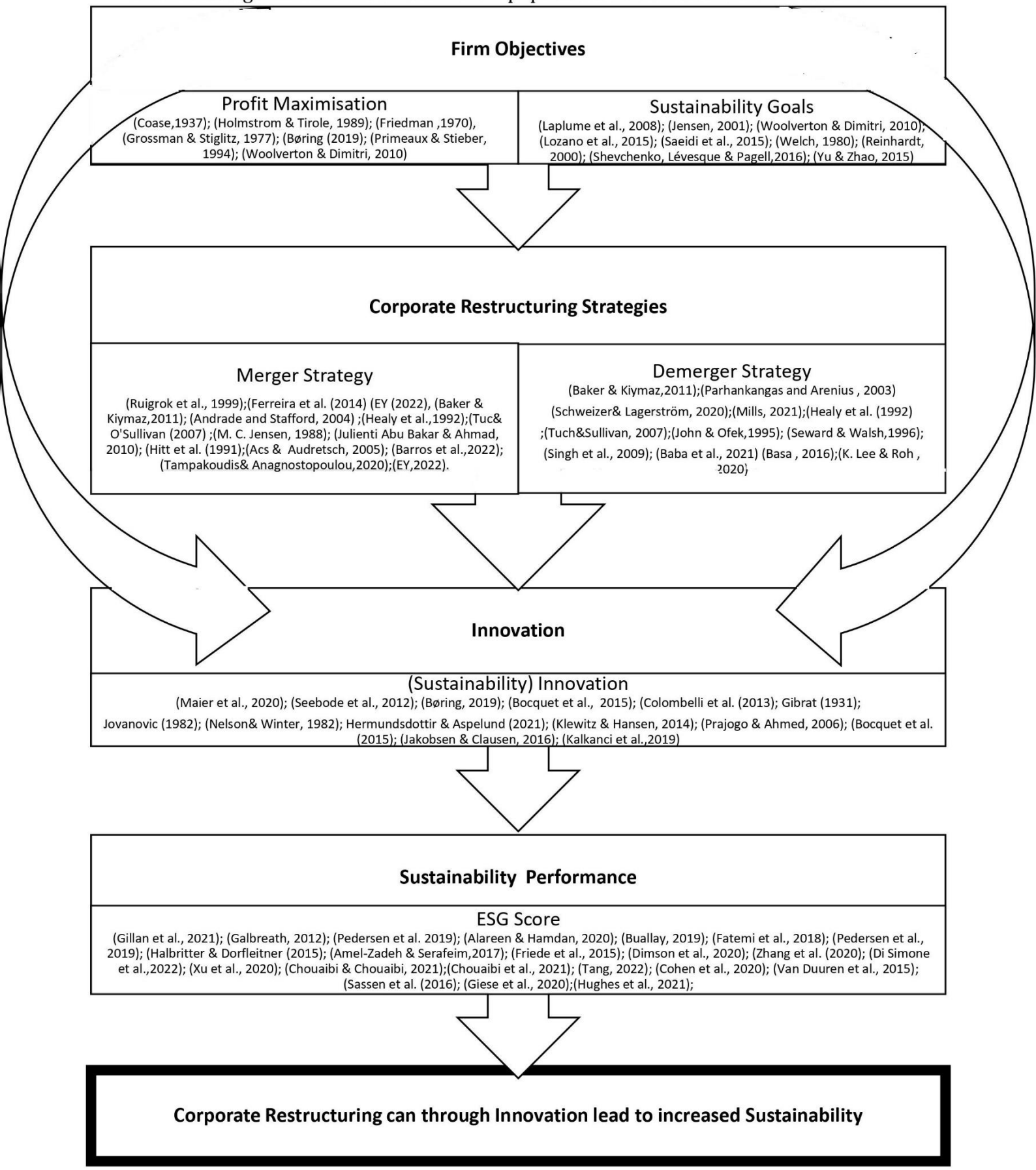
Merger Strategy

A merger is a firm restructuring whereby at least two firms combine to form a new legal entity through a transaction (Dezi et al., 2018). It is closely related to a takeover and acquisition transaction, which is when an acquiring firm takes control of the majority of the equity of a target firm. These are well-liked methods of external corporate expansion, acting as strategies for corporate restructuring and control (Lee & Lee, 2022). Thus, these transactions are often combined under an overarching term called merger and acquisition (M&A) (Alhenawi et al., 2018). Even though it is strictly not a strategy but a method, this thesis defines Merger Strategy as a restructuring strategy where a firm acquires more than 50% of the equity in a target firm. In 2021, M&A was one of the most used strategic options to boost firm innovation and sustainability, with $5.5 trillion in deals (EY, 2022).

Demerger Strategy

Colloquially speaking, the opposite of a merger is a demerger. However, a demerger can refer to several restructuring transactions: split-up, spin-offs, divestments, and carve-outs. In recent years, there has been a trend of large firms splitting into smaller firms. Examples of these global conglomerates splitting up include, but are not limited to, Johnson & Johnson, Toshiba, and GE (FT, 2021). These firms split up because they became too large, and investors find it hard to value them appropriately due to their many diversified business units (La Monica, 2021). Besides, firms like Ford also try to overcome the market valuation discount by splitting the firm into separate reporting business entities, Ford Blue and Ford Model e (Mullaney, 2022). So, to keep the definition clear, this thesis will define a restructuring strategy that mainly uses a technique where a firm break up into two or more independent and separately run firms, as a Demerger Strategy.

The following mechanisms and academic papers are central to this thesis research:



The formulated research question will lead to novel research with unique contributions to several areas of academics and business. Namely, it is one of the only academic studies that compare both Mergers and Demergers corporate strategies vis-à-vis each other within standalone research, with a sustainability proxy as the primary dependent variable. Furthermore, in particular, it focuses on the geography of Europe. Namely, firms here prioritise ESG goals through strategy and M&A growth the most (Hood & Gall, 2022). It is expected that the results of this research will indicate that an inflexion point in the firm's current size will determine whether a merger strategy or a demerger strategy is more beneficial moving forward. Therefore, to a great extent, it will depend on the firm's current size whether a firm should pursue one or the other strategy when increasing ESG.

The contributions will be four-fold. Firstly, the obtained results can practically be insightful for C-level corporate officers tasked with crystalising stakeholders' demands regarding the firm's future sustainability (Teigland & Hobbs, 2022). Namely, ESG consultants and C-suits officers could learn how to adequately integrate sustainability (innovation) into their firm's strategy through mergers or demergers. Moreover, it contributes to three academic literature fields. Firstly, Corporate Strategic Management as it builds upon the works of Tampakoudis and Anagnostopoulou (2020), who similarly specifically focused on EU firms and Barros et al. (2022), both studies researched the effect of M&A on ESG Scores. Secondly, (Green) Innovation Economics, by this Cefis and Marsili (2015), Zhang et al. (2020) and Di Simone et al. (2022), also focused on the intersection of innovation and sustainability. Lastly, (Sustainable) Corporate Finance, supplementing studies of van Duuren et al. (2015) and Amel-Zadeh and Serafeim (2017).

The remainder of the thesis is structured in six sections. Firstly, an in-depth and elaborated Theoretical Framework section that forms the foundation for the rest of the thesis which is established by reviewing existing academic literature. Next, the Data &Methodology section is subdivided into a Data and a Methodology subsection. In the Data subsection, the employed variables and data sources are discussed. In the methodology, the utilised statistical analyses are elaborated upon. In comparison, the Results section will shed light on the core results of the previous analyses. These main findings are summarised in the Conclusion, wherein the research question and the four hypotheses will also be answered. The Limitations & Future Research is the last section, and herein, the research's validity and possible future research designs will be discussed.

2. Theoretical Framework

2.1 Firm Objectives

The Theory of The Firm: Profit Maximisation

Following the Introduction, it is clear that firms are subject to various pressures to transform and shift their objectives, but why do firms actually conduct themselves in the existing way? In, The Nature of the Firm, Coase (1937) made an effort to theoretically develop from a neoclassical perspective an overall structure to define a firm. His transaction-cost-lowering-based definition of a firm now lies centrally in the overarching Theory of the Firm. A theory that, among other things, tries to explain firms' existence and objectives (Holmstrom & Tirole, 1989). This neoclassical view of economics has led to the wide micro-economic belief that firms exist to seek profit, and thereby their solitary objective is to maximise profits. This view did not change much in the following decades.

For example, Milton Friedman (1970) notoriously argued that the only social responsibility that a business has is to increase its profits. Namely, Friedman was under the strict impression that a firm was not an independent entity with its own responsibilities but a grouping of employees who use firm resources to obtain goals set by shareholders (Friedman, 1970). Therefore, firms solely exist to create profit and value for their shareholders as they finance their resources and desire this objective. Whereas, Grossman and Stiglitz (1977) describe the firm value as the value of output minus the value of inputs, as there are prices for all goods and factors in a market economy. Børing (2019) says that every individual d value maximisation as an increase in the firm's market value also leads to a Pareto improvement for the individual (budget constraint).

Therefore, the overall consensus that the firm's primary objective is to maximise profits has remained fundamental in economic literature (Primeaux & Stieber, 1994; Woolverton & Dimitri, 2010; Børing, 2019). However, even Friedman was under the impression that firms may also want to pursue other objectives, like sustainability. Still, he argues that firms do not engage in sustainable activities out of moral or ethical motives but from an intrinsity of self-interest (Friedman, 1970). Namely, this firm objective will also improve overall societal welfare (Smith, 1776). Friedman concludes that firms may only seek corporate sustainability and ESG targets if it leads to higher profits for their shareholders.

Sustainability Oriented Theory of the Firm and the Enlightened Stakeholder Theory

However, a contrasting theory referred to as Stakeholder Theory argues that firms should pursue objectives and take actions that consider the interests of all stakeholders of a firm (Laplume et al., 2008). According to this proposed theory, besides for shareholders, firms should try to maximise value for employees, customers, suppliers, and the environment. Jensen (2001) also discusses that customers want high-quality, sustainable products for low prices. In comparison, employees want good working conditions with fair wages. Likewise, suppliers want decent deals. Lastly, financiers desire high returns at low risks.

Nevertheless, this notion rallies against the mantra of profit maximisation, which is a stable reoccurrence in many works of management researchers and neoclassical economists. For instance, Jensen (2001) found that firms could not maximise multiple varying objectives, as this would make the decision process too complex for the firm's managers and would leave the management to a greater degree with no objectives. At the same time, firms could, however, focus on certain alterations of a specific firm objective. Woolverton & Dimitri (2010) find that some shareholders may want firms to have sustainability as an objective. Firms would then dissuade from pure firm profit maximisation, as this would maximise shareholder utility. Nonetheless, a divergence of objective alignment from shareholders can decrease the ability to maximise shareholder utility due to the complexity of pursuing mixed objectives (Woolverton & Dimitri, 2010).

Woolverton & Dimitri (2010) divide the current academic body of work on firm sustainability into a different dichotomy. Firstly, researchers that focus on researching firms' private provisions of environmental public goods. While the second school of the literature concentrates more on the labelling of food origin and other social objectives.

Multiple academic studies found evidence that improved firm sustainability can improve shareholder value (Lozano et al., 2015; Saeidi et al., 2015). Hence, it is clear that sustainability is vital for firms. The question becomes whether firms should actually pursue additional objectives next to profit maximation, as there is only a negative relationship between seeking profits and achieving other firm objectives if absolute profit maximisation is pursued (Welch, 1980). Jensen (2001) tries to answer this question by combining the two contrasting theories and creating the Enlightened Value Maximisation and Enlightened Stakeholder Theory. He believes a firm cannot maximise its value if it

disregards the interest of its stakeholders. Firms can improve their managerial, organisational, and governmental performance by maximising the total long-term firm market value, including stakeholders (Jensen, 2001). Further, he explains that changes in the firm's total long-term market value are the gauge by which success is measured. The focus is on the long run, as the effect of the choices made may only come apparent then. Reinhardt (2000) finds that firms are sustainable if their outputs can be sold for more than their inputs' total social or private opportunity costs. However, the shareholder are only endowed by the possible profits they can gain. With this the higher social and private costs of inputs compared to the market costs force the firm to be more efficient at creating profits. The created profits from its activities keep the firm on the market. Hence, Reinhardt (2000) reasons that firm sustainability is fundamentally and holistically linked to its existence, as the firm's existence is not viewable as separate from its sustainability.

Lozano et al. (2015) also find by reviewing multiple decades of research that sustainability plays a vital role in the existence of firms and, based hereon, propose the Sustainability Oriented Theory of the Firm: a firm is a profit-generating entity constantly in evolution. Similar to Lozano et al. (2015), Shevchenko, Lévesque & Pagell (2016) also concluded that, to some extent, firms need to be sustainable to keep existing. Firms that currently are not sustainable cannot stay active in the market for long without profoundly changing their way of doing business, taking into account the interests of all stakeholders.

Firm addressing sustainability concerns is a genuinely global phenomenon. For instance, Yu & Zhao (2015) carried out an international analysis of firm valuation and sustainability, which aimed to outline the sustainability practices of firms in an international context. Based on a 13-year sample and while utilising the Dow Jones Sustainability Index to measure firm sustainability performance, they found a positive relationship between sustainability performance and firm value. The effect seems to be more significant for countries with strong investor protection and high disclosure levels.

In sum, profit maximisation only gives firm managers an end goal (objective), but a proper strategy to reach the objective is missing. It is only an end and not a means to an end. Managers without a strategy only focus on activities that they believe would create value. Therefore, firms that aim to obey the Enlightened Stakeholder Theory and Sustainability Oriented Theory of the Firm need an adequate corporate strategy to reach their objective.

2.2 Innovation

(Sustainable) Innovation on Firm Objectives

Now that it has already been established that increased sustainability can improve financial firm performance. Other methods that may aid in the firm objective dilemma need to be explored. Innovation-enhancing firm strategies are a category of corporate strategies that can perhaps solve the financial and sustainability performance conflict. Namely, innovation is crucial for firms to improve their sustainability (Maier et al., 2020).

There are many terms in literature to refer to sustainability-oriented innovation: green innovation, environmental innovation, eco-innovation and social innovation (11%) (Hermundsdottir & Aspelund, 2021). However, the existing literature is severely weighted toward the environmental aspect of sustainability (80%), and thus, innovations focused on decreasing environmental impacts (Klewitz & Hansen, 2014; Hermundsdottir & Aspelund, 2021). Therefore, this thesis will use the definition, Sustainability Innovation, "a process where sustainability considerations (environmental, social and financial) are integrated into company systems from idea generations through to research and development (R&D) and commercialisation. This applies to products, services and technologies, as well as new business and organisation models" (Charter & Clark, 2007). This is often seen as the sixth long wave of innovation (Seebode et al., 2012) (Appendix1).

There are limited studies that analyse the combined effects of (sustainable) innovation strategy and sustainability strategy on firm performance (Børing, 2019). Nevertheless, Bocquet et al. (2015) discovered two types of firm performance measures in the current academic body of work: financial and real performance. However, most studies strictly focus on financial firm performance, primarily simple profitability measures, like the Rate of Return on Assets (Bocquet et al., 2015). Contrastingly, real performance is a little bit more complex to assess. Real performance measures the level of competitive advantages a firm has obtained: Firm Technological Performance measure (FTP) or Sales Growth, %.

Moreover, Colombelli et al. (2013) conclude that three frameworks have been developed to measure the effect of innovation on firm growth in the current academic literature. Firstly, the framework relates to the Law of Proportionate Effects developed by Gibrat (1931). The framework relies on a presumption that the distribution of firm sizes is highly skewed, following a log-normal function, and thus is characterised by a random walk.

Secondly, the framework of Jovanovic (1982) uses the understood inverse relationship between firm age and growth as a basis to expect excessive growth across firms by younger aged firms. Finally, Nelson and Winter (1982) argue that firms compete in the same market but have different production costs. They will have varying capabilities and efficiency levels. Consequently, this affects the growth rate of firms in the same industry.

Based on a systematic literature review that includes over 100 relevant peer-reviewed publications, Hermundsdottir & Aspelund (2021) determine that sustainability innovations can simultaneously increase both firm sustainability and competitiveness. This solidifies the notion that firms can obtain a win-win situation through sustainability innovation. This uplift in firm performance is characterised by increased value creation, reduced costs, and a boost in non-financial assets Hermundsdottir & Aspelund (2021). Klewitz & Hansen (2014) also ascertain that firms with more ambitious sustainability objectives require higher radical innovation. Moreover, they analyse that sustainability innovation is more complex than traditional due to multiple objectives needing attention. The firm's culture also needs to change for this innovation type (Prajogo & Ahmed, 2006).

Furthermore, Bocquet et al. (2015) found, based on a sample of 213 firms and with firm growth as a measure of medium-term economic performance, that innovation is a significant determining factor in the positive relationship between sustainability and firm performance. Such as, firms with a strategic sustainability plan significantly experience higher growth through both product and process innovations than responsive sustainability actions. Being reactive contributes to adverse effects on firm performance. Similarly, Jakobsen and Clausen (2016) discovered through an extensive survey among firms, and a theoretical review of innovation determinants that successfully achieving set sustainability objectives by firms is predominantly achievable by implementing product or process innovations, i.e. developing new products or processes. Firms' adoption of sustainability objectives directly and indirectly influences the entire innovation process.

Interestingly, Kalkanci et al. (2019) observe that social sustainability objectives also require sustainability innovation. Product innovation, process model innovation, and supply chain innovation are essential to addressing social concerns within this context. Still, more importantly, it is found that firms need to collaborate with the public sector, civil society organisations, and local citizens for sustainability innovation to be successful.

2.3 ESG performance

As established in the Introduction, an ESG Score is a method that measures sustainability across Environmental, Social and Governmental dimensions. According to Pedersen et al. (2019), ESG Scores have two primary use cases in the current academic literature. Firstly, a method to assess firm sustainability and its effects on firm performance indicators, like profits and innovation performance. Secondly, a way to quantify the sustainability of an investment opportunity and the relationship to the investment decision-making process. An advantage of using a firm's ESG Score as a proxy for firm sustainability is that it allows for interrelationships between a firm's governance structure and its environmental and social activities toward increased sustainability in the measurement (Gillan et al., 2021).

ESG performance and Firm Value

Past academic studies within corporate finance have found mixed findings for ESG on firm value and performance. Namely, most papers find a positive relationship between a firm's ESG performance and firm value, firm risk, and financial performance. Nevertheless, these results greatly depend on the firm's market, leadership, and ownership characteristics (Gillan et al., 2021). Although, a few papers do find a negative effect in the long term: a high ESG performance returns high values in the short-term but lower returns over time. Galbreath (2012) studied 300 firms listed on the Australian Securities Exchange from 2002 to 2009 and observed that the governance component of the ESG Score improved more and quicker than environmental or social performance over the observation period.

Pedersen et al. (2019) conclude that ESG strengths increase firm value and that ESG concerns decrease it. Furthermore, the disclosure of ESG strengths moderates the positive effect of firm value, as it signals to investors that the firm is trying to justify overinvestment in sustainability. However, at the same time, ESG disclosure lowers the concern levels of investors, showing them that firms are taking proper steps toward ESG. Based on a sample of US S&P 500-listed firms, Alareeni and Hamdan (2020) observed a significant positive impact of ESG on firm performance, measured by Return on Assets, Return on Equity, and Tobin's Q. However, the sign of the effect differs when looking at each of the separate ESG components. Besides, these results are sometimes quite industry-specific, like in the banking industry (Buallay, 2019). Fatemi et al. (2018) found the same moderating effect of ESG disclosure between ESG and firm value. They also find that high ESG performance enhances the firm value and that ESG weakness decreases it.

ESG performance and Investing

ESG Scores have in recent years increasingly been incorporated into the investment decision-making of investors. For example, Pedersen et al. (2019) analyse how investors invest and thus spread their portfolio across the so-called "ESG-efficient frontier". The equilibrium asset returns satisfy an ESG-adjusted capital asset pricing model (CAPM). Furthermore, they find that investment opportunities with a high governance sub-score have an above-average investment return. Whereas a high social sub-score negatively or barely affects the return of investment. Lastly, the environmental sub-score does not affect investment returns in this study. Halbritter and Dorfleitner (2015) found a similar overall relationship between ESG and return on investment based on a review study of ESG data from the U.S. market from 1991 to 2012. However, they recognise that the magnitude and direction of the impact of ESG Scores on investment returns are greatly dependent on the ESG Score provider, the firm sample, and the observation period used.

In the academic research by Amel-Zadeh and Serafeim (2017) conducted under investment managers of major investment firms, it was discovered that the most prominent use of ESG Scores by investors was to gather knowledge regarding the possible investment performance. They namely believe that current ESG performance proxied the likely future financial return. At least when the investors completely integrated the ESG information within their investment decision-making process. Another substantial reason these investors use ESG metrics is that clients demand it from the investment firms (Amel-Zadeh & Serafeim,2017). In a very comparative research, van Duuren et al. (2015) obtained harmonising results. However, compared to European managers, they find that U.S. managers believe significantly less in utilising ESG Scores regarding potential financial return and thus see less benefit of integrating ESG in their investment process. Another review of 2200 distinct studies finds a nonnegative relation between ESG and financial performance (Friede et al., 2015). Moreover, a time-consistent positive relation.

In contrast to financial bond rating agencies, ESG Scores often differ across score providers (Dimson et al., 2020). The underlying principle behind this phenomenon is that each score provider uses a different methodology to quantify ESG. With this, for example, varying weights are given to each of the separate components across the different rating agencies. Dimson et al. (2020) also find that solely using ESG scores as the investment decision-making rationale does not lead to above-average portfolio returns for investors.

ESG performance and Innovation

According to Zhang et al. (2020), limited academic studies research the combined effect of sustainability and corporate sustainability strategy on firm value. Di Simone et al. (2022) see a growing trend in literature on ESG and innovation as factors for firm value. Based on quantile regressions of Chinese listed companies between 2012 and 2018 and by dividing ESG into their separate components, Zhang et al. (2020) observe that sustainability innovation can increase medium- and high-level firm value. This also occurs when the firm discloses environmental and social information. However, a substitution effect on firm value arises when sustainability innovation and social disclosure combine, weakening the growth of firm value over time. Thus, Zhang et al. (2020)suggest that taking into account this interaction effect is essential for firms that aim for sustainability-oriented profitability, as there is conflict in resource allocation between these two factors. For instance, the level of available capital investment. This conflict is complicated by the fact that ESG is composed of three elements, and the execution cost of each of them differs.

Di Simone et al. (2022) deduce a positive relationship between market-perceived innovation and economic sustainability from a conducted empirical analysis of the 909 most innovative listed firms globally from 2013 to 2017. Also, in the ESG sub-score analysis, the social sub-score has the strongest effect on economic sustainability. Hereby, economic sustainability is a firm objective that guarantees long-term growth and survival. Whilst Xu et al. (2020) analysed 223 listed Chinese companies from 2015 to 2018 and returned with three main findings. Firstly, high ESG performance can increase the number of sustainability invention patents. Secondly, R&D investment increases sustainability innovation performance. Lastly, the authors also find that ESG performance moderates the relation between a firm's R&D investment and sustainability innovation performance.

Chouaibi and Chouaibi (2021) sought to analyse how ESG integration into the corporate strategy affects the financial valuation of firms seeking ESG objectives. By examining a global data set of firms between 2005 and 2019, they witnessed that ESG-enabled corporate strategies do not only improve financial performance through increased ESG performance. Besides that, sustainability innovation also improves ESG performance and thus acts as a mediator. Therefore, this suggests that firms seeking sustainability-oriented profitability can achieve this objective by investing resources in sustainability innovation. Chouaibi et al. (2021) repeat the previous study and find that firms' sustainability

innovation seems to indirectly add to the total positive effect of increased ESG practices on a firm's financial performance. However, now they only use a sample of German and UK law firms. At the same time, Tang (2022) argues that the path of how ESG performance affects corporate innovation has too often been overlooked in the academic literature. Especially when this push for sustainability comes from stakeholders with heterogeneity. The author concludes, based on a sample of Chinese listed firms, that ESG performance significantly increases corporate sustainability innovation volume and level. However, this relation is mediated by alleviating the financial constraints and agency costs. Also, a higher governance sub-score boost ESG performance's effect on firm innovations more.

Paradoxically, Cohen et al. (2020) discover that firms in the United States with relatively low ESG scores, like oil, gas, and energy-producing firms, are essential producers of sustainability innovations when measured by green patents. Nevertheless, these firms are often excluded from capital funding. The authors try to explain this contradicting phenomenon by referring to the fact that these low-scoring firms face high stakeholder pressures to increase sustainability and hence try to increase sustainability through (sustainability) innovation. This insight now builds on the rest of the thesis' mechanisms.

ESG performance and Risk

Van Duuren et al. (2015) recognise that investment managers also use ESG information for red-flagging and managing the risk of potential investment opportunities. Moreover, Sassen et al. (2016) also acknowledge that the body of work related to the impact of ESG on firm risk is still minimal compared to the literature on ESG performance on financial firm performance. Furthermore, based on an extensive European panel dataset of 8752 firms in the period 2002–2014, they conclude that ESG performance lowers firm risk: systematic, idiosyncratic, and total risk. However, when analysing each of the components of ESG separately, it is found that the Environmental performance primarily only affects the risk of firms active in environmentally sensitive sectors. At the same time, social performance can significantly reduce firm risk and enhance firm value. Surprisingly, no significant effect of corporate governance performance on firm risk in the study was seen. Therefore, ESG Risk scores also exist next to the traditional ESG scores. Whereas ESG sores focus on a firm's ESG performance based on reported data. ESG Risk scores measure firms' exposure to ESG risks (Giese et al., 2020). Recently, Tech & AI-driven alternative ESG scores have increased in esteem but remain novel in research (Hughes et al., 2021).

2.4 Corporate Restructuring Strategies

Innovation-enhancing firm strategies

So far, this thesis has made apparent that innovation and, thus, innovation-enhancing firm strategies are critical strategic options for firms to consider when seeking ESG objectives. However, there exist many innovation-enhancing strategies. Moreover, a characteristic that these strategies often have in common is that they require a corporate restructuring of the firm through acquisition and divestiture transactions (Bowman & Singh, 1993). These innovation strategies range from internal innovation, open innovation, strategic innovation alliances, joint ventures, corporate venture capital strategy to innovation acquisition (Bowonder et al., 2010). Hence, to modelise this occurrence, this thesis focuses on two opposing extremes of the entire strategy spectrum: Mergers vs Demergers.

Merger Strategy

As defined in the Introduction, this master thesis presumes that a Merger Strategy is a strategy where a firm acquires more than 50% of the equity in a target firm. With this, the existing corporate structure of the acquiring firm changes significantly once the target integrates into the entity. This rapid change in the firm's structure often happens across three main dimensions: assets, capital structure, and management (Ruigrok et al., 1999).

Ruigrok et al. (1999) reckon that a Merger Strategy can have several advantages for an existing firm. Firstly, it allows for increased size, resources and capabilities. Consequently, this expands the firm's market share and dominance within this market. Thirdly, it helps firms overcome the barrier of entry in markets with high barriers of entry, as it is less expensive and less risk-intensive compared to other strategies like a greenfield investment. Lastly, there is ample opportunity for knowledge transfer from the target firm. The latter mainly affects the innovation performance of the acquiring firm.

Ferreira et al. (2014) have recognised that Merger Strategy research forms a significant part of the academic literature. Most often researched from a perspective of agency theory, institutional theory, transaction cost theory, and the resource-based view. Based on a bibliometric review of 334 studies from 1980 to 2010, Ferreira et al. (2014) found that a Merger Strategy has been a leading firm strategy across sectors for decades. According to EY (2022), this will continue in 2022, as 59% of CEOs plan to pursue it in the coming year. Namely, it significantly affects firm performance, particularly in the long run.

Demerger Strategy

It has also been established in this thesis that a Demerger is defined as Demerger Strategy as a strategy where a firm splits into two or more independent and separately run firms. With this, the demerged firm or entities can be managed autonomously or be acquired by another existing or newly formed third-party firm. Baker & Kiymaz (2011) argue that a Demerger Strategy is the reversal or correction of a previous Demerger Strategy, hence decreasing the broadening nature of a demerger. Still, this does not always need to be accurate as firms can also demerge internally created or organically grown firm entities.

Parhankangas and Arenius (2003) used cluster analysis to develop a taxonomy of transaction types within a Demerger Strategy and identified three post-transaction firms: spin-offs developing new technologies, spin-offs serving new markets and restructuring spin-offs. They see that the type of firm is dependent on the remaining knowledge transfer between the legacy firm, transaction timing, and the innovation level within the new firm.

In the same line, Schweizer and Lagerström (2020) argue that a demerger transaction follows six phases that can be greatly compared with a traditional divorce of a married couple: disillusionment, erosion, detachment, physical separation, mourning, and second adolescence/hard work. Hereby, the motivation of the demerger transaction greatly impacts the intensity and tenure of each of the phases. One of the primary motives for implementing a Demerger Strategy is to increase firm focus on core activities Baker & Kiymaz (2011). When separated, selling and demerged firms can also be more optimally valued in the capital market due to the reduction of information asymmetry and a clearer investor story. Sharpe and Suarez (2013) analysed 75 firms implementing Merger and Demergers Strategies during 1990-2001 and noted that increased firm focus and removing low-performing divisions were the reasons behind using a Demerger Strategy.

Firms often use a Demerger Strategy to use the proceeds from the divestments to allocate capital towards the core capabilities that generate long-term value for the firm. These capabilities most often include technology (79%) and innovation (65%), which can also increase ESG performance (Mills, 2021). In addition, the selling firm can use restructuring as an opportunity to overhaul the rest of the internal organisation, as the employees are already prepared for change. As a result, the firm can reposition itself while reducing risk by changing the business focus and remodelling operations to the new business strategy.

Merger Strategy vs Demerger Strategy on Firm performance

Baker & Kiymaz (2011) reviewed the current body of academic literature on Merger Strategy and discovered that the studies aimed to research the long-term effect of a Merger Strategy on the firm performance after buying firms return mixed and inconsistent results. Nevertheless, Andrade and Stafford (2004) find that mergers transactions significantly cluster over time and by industry. Moreover, merger transactions of firms are also responsible for the expansion and contractions of broad industry restructuring. Ferreira et al. (2014) also argue that merger transactions are responsible for the uptick in the efficiency and effectiveness of whole industries. Besides, these transactions also positively increase the competitive advantage of the specific firms engaging in this strategy and thus improve their firm performance (Ferreira et al., 2014).

In contrast, Ferreira et al. (2014) also find that a Merger Strategy can harm firm performance post-acquisition. Several factors can explain this paradox occurrence. Firstly, they are selecting the wrong target firms. Secondly, the proposed synergies do not come to fruition due to resource-relatedness. Also, the expected full integration fails due to cultural and organisational differences. Lastly, excess debt post-acquisition deteriorates the firm's finances. Whereas Healy et al. (1992) analysed post-acquisition performance for the 50 largest U.S. mergers between 1979 and mid-1984. They concluded that a Merger Strategy significantly increases the asset's productivity within the firm, leading to better operating cash flow returns than their peer-industry averages. Even so, Tuch and O'Sullivan (2007) see negative returns when reviewing long-term event studies.

The academics of Demerger Strategy on Firm performance exhibits quite more consensus. For instance, John and Ofek (1995) found that a demerger can improve the subsequent operating performance of the seller's remaining assets. This performance increase seems especially true when increased focus was the originating rationale for the demerger transaction. Meanwhile, Seward and Walsh (1996) observe a significant positive effect of restructuring announcements on share prices. Still, the authors find contradicting results for other firm performance measures: return on operating cash flow and return on total assets two years after the transaction. Likewise, stakeholder alignment also seems to lack. More recently, when examining the average of the six months price of the demerged company before and after the demerger, Singh et al. (2009) observed that after the demerger, there is an increase in the total wealth of the shareholders in most the cases.

Merger Strategy vs Demerger Strategy on Innovation

From the early years, it has already been apparent what role a Merger Strategy can have in creating and maintaining a firm's competitive advantage. This link with innovation has been paramount for this form of value creation (Ruigrok et al., 1999). Ruigrok et al. (1999) examined the effects of a Merger Strategy and a Demerger Strategy on firm innovation using an integrated systematic theoretical model. Their model is displayed in Appendix2. Earlier, M. C. Jensen (1988) already realised that corporate restructuring might entail significant changes to the firm. These changes include the corporate strategy, market conditions, competitors, employees, suppliers, customers and increased debt. All these changes can lead to expansionary and contracting shifts in firm resources. Notably, firm resources are essential for innovation within a firm (Julienti Abu Bakar & Ahmad, 2010).

Hitt et al. (1991) conclude that the mergers directly lead to a lower R&D intensity and patent intensity in the firm; both are methods to measure the firm's innovation level (Acs & Audretsch, 2005). They argue that this results from the fact that available firm capital is used for the acquisition and cannot be used for investments in R&D. On the other hand, Hoskisson and Johnson (1992) researched firms that adopted a Demerger Strategy in the 1980s. First, they find that firms with a high level of diversification, thus many unrelated business divisions suffer from organisational inefficiencies and struggle with strategy focus due to the current corporate structure. Secondly, firms that restructured and demerged for strategic reasons displayed higher R&D intensity. In contrast, firms that increase their diversification through a Merger Strategy decrease their R&D intensity over time. They thus imply a partial substitution effect between diversification and R&D. In other words, a relation exists between mergers and demergers on internal innovation.

Ruigrok et al. (1999) explain that the negative relationship between mergers on internal innovation has to do with the constrained firm capital and intense time commitment of firm managers when involved in a merger transaction. Therefore, firms may have more resources but cannot adequately manage these resources towards innovation efforts in the short term. Only in the long run, after finalising the integration process, firm managers regain time and become more risk-taking towards innovation endeavours within the firm. At the same time, they also argue that firms with a demerger strategy could stay highly innovative by acquiring firms that have produced innovations (Ruigrok et al.,1999). Hence, a relationship also exists between mergers and demergers on external innovation.

Even though it has now been established how a merger strategy can lead to increased innovation, Ruigrok et al. (1999) also elaborate that this increased innovation can lead to a competitive advantage for the firm but with a lower internal innovation level over time. However, the most critical determining factor for firms to successfully adopt this strategy is the ability to transfer knowledge from the target firm to its own internal organisation. When the knowledge vested within the acquired firm is merged with internal knowledge of the firm in new arrangements, it can lead to value creation in the form of improved available resources, firm capabilities, and innovation output by the firm (Weber, 2012).

The mechanisms by means intra-firm knowledge transfers happen, ex-post a corporate restructuring have not been studied extensively. Nevertheless, Bresman et al. (2009) try to change this by using questionnaire data, and the authors note that knowledge transfer of technological skills is enabled by communication, visits and meetings, and by time elapsed since the transaction. Whereas the knowledge transfer of patent knowledge is characterised by the cross-firm understandability of the knowledge, the size of the acquired unit, and the transaction maturity (Bresman et al., 2009). Lastly, they conclude that knowledge transfer will be one-dimensional from the target firm to the acquiring firm in the short run and that bilateral knowledge transfer is only possible in the long run.

Ensign et al. (2014) see that geographic, cognitive, and organisational proximity to a high degree affects the knowledge transfer and innovation of the firm after a Merger Strategy influenced transaction. However, the magnitude of the effect significantly depends on the level of management interventions post-transaction. Glaister & Ahammad (2010) see that organisational culture differences negatively influence the degree of post-transaction knowledge transfer. The gain of explicit rather than tacit knowledge is often emphasised more in the post-transaction integration due to potential complementarity (Ai & Tan, 2017). Wang et al. (2017) plead that firms should regard organisational unlearning as crucial for knowledge and routine compatibility as this stimulates knowledge transfer.
Huang et al. (2012) note that the motivation behind the restructuring transaction is paramount in the firm's innovation process, as this has a potential chain reaction: high motivation for the transaction will lead to a greater desire for knowledge transfer, leading to a better knowledge transfer process and hence superior knowledge transfer in the end. Lastly, Arora et al. (2001) see that Merges and (refocusing) Demergers are essential to alter a firm's innovation level, whereby (net) acquisitions have the highest positive effect.

Merger Strategy vs Demerger Strategy on Sustainability

Thus a Merger Strategy and Demerger Strategy can lead to increased innovation, especially for the latter strategy, knowledge transfer is integral. However, the (direct) relationship between Merger Strategy and Demerger Strategy on Sustainability remains unexplored in the master thesis until now. Interestingly, Barros et al. (2022), with panel data from 2002 and 2020 from 41 countries, research whether using a Merger Strategy impacts the firm's ESG performance. They reveal that merger transactions positively affect the firm's ESG Score for all sub-scores. The caveat, however, is that the effect is only measurable in a delayed fashion in the following year of a finalised merger transaction.

Tampakoudis and Anagnostopoulou (2020) analyse 100 European mergers and acquisitions between 2003 and 2017 and determine that the acquisition of targets with better ESG performance pre-transaction aid acquiring firms in increasing their post-transaction ESG performance and consequently its market value. Moreover, the effect seems to be particularly robust when the ESG score of the target firm was initially higher than the acquirer. So, acquirers seem to be successful at transferring knowledge from their targets. B. Li et al. (2020) found by empirically analysing the most heavily polluting firms in China from 2008 to 2016 that business model innovation can be achieved by a sustainability-focused merger strategy. Herein, firms with significant research and development (R&D) expenditures have a better opportunity to achieve actual business model innovation through sustainability-focused mergers. Moreover, their business models are traditionally the most complex to restructure and improve, especially for the heaviest polluters. Therefore, the acquired knowledge can help the unsustainable firm develop its firm capabilities toward sustainability. Moreover, the new business model and innovation obtained from ESG -focused mergers aid them in protecting these innovations.

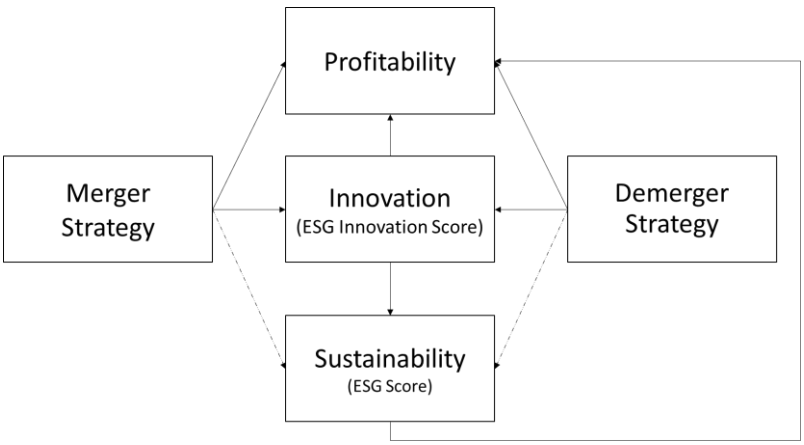
Firms are using the turbulent times of covid to restructure themselves with strategic mergers to meet their growth ambitions towards sustainability. Remarkably, 99% of surveyed firms weigh ESG concerns in their most recent merger transactions (EY,2022). At the same time, 20% of firms disclose that they engage in merger transactions to increase their sustainability and ESG Score, as firms are currently determining for themselves whether a buy or build strategy is more equipped to boost a firm's ESG Score. Still, there is a trend for sustainability-focused merger transactions across all industries, but to a greater extent within the automotive, industrial and consumer sectors (EY,2022).

On the other hand, a firm could also try to use a Demerger Strategy to improve its sustainability. This refers to voluntary demergers, including refocusing and downsizing. According to the EY Divestment Study, two-thirds of European firms plan to implement a Demerger Strategy and thus, divest part of the firm within the next two years (Mills, 2021). Pursuing ESG objectives is one of the principal rationales for firms to engage in this strategy. Globally, 46% of the surveyed firms state that ESG concerns directly influence their divestment plans (Mills, 2021). Environmental like their carbon footprint and social concerns, such as diversity and equality, seems to be the most critical sources for divestments. However, the ESG concerns also sometimes stem from governmental regulations and shareholders. Furthermore, firms also use a Demerger Strategy to split themselves into ESG-friendly and ESG-unfriendly firms that can operate better separately.

Furthermore, Baba et al. (2021) conducted a structural analysis of 268 demerger projects between 2012 and 2021. Herein, the authors fail to find significant differences in the financial performance of firms before and after a demerger transaction. Nevertheless, they find evidence in their analysis that firms use this opportunity to successfully reformulate their strategy and increase their survivability in the medium and long run. Furthermore, with this corporate restructuring decision, Basak (2016) observe that firms can improve their ESG performance and, thus, sustainability. Finally, K. Lee & Roh (2020) conclude that a proactive Demerger Strategy is critical in firms obtaining firm sustainability through innovation. Especially when looking at R&D intensity input measured by the number of patents but less deeply when measured by innovation output.

The relevant (academic) literature discussed so far led to the following theoretical model:

Figure 1 theoretical model of the thesis



2.5 Hypotheses

Based on the discussed literature, six hypotheses are developed to aid in answering the main research question of the master thesis. Lemus-Aguilar et al. (2019) review that the corporate structure of a firm is critical in innovation efforts and creating new or adjusting business models towards increased sustainability. To increase a firm's ESG Score, firms need to improve their sustainability performance (Pedersen et al. (2019). Sustainability innovations can mainly achieve this (Chouaibi et al. (2021). Furthermore, for the relatively complex sustainability innovation to be successful, firms need a high volume of unique resources and capabilities, according to the resource-based view of the firm, while a demerger reduces a firm's resources (Julienti Abu Bakar & Ahmad, 2010; Weber, 2012).

H1: A Merger Strategy improves a firm's ESG Innovation Score more than a Demerger Strategy.

A corporate restructuring strategy can benefit firms seeking higher sustainability. As Vastola and Russo (2020) unearth that a restructuring can lead firms to decrease (losing) or improve (embedding or adding) their sustainability performance post-transaction. In addition, the academic literature that uses ESG Scores as a proxy for sustainability is very robust and has become a consistent mainstay (Gillan et al., 2021). For example, Tampakoudis and Anagnostopoulou (2020) find a positive effect of M&A on ESG scores.

H2: A Mergers Strategy improves a firm's ESG Score more than a Demerger Strategy.

Previous studies have mainly only focused on the combined ESG Score (Di Simone et al., 2022). Hence, the subsequent three hypotheses relate to the separate ESG Score pillars, "E" vs "S" vs "G". Sustainability innovation is especially needed to improve the environmental component of the ESG Score (K. H. Lee & Min, 2015). Additionally, equivalent results are found by Zheng et al. (2021), as they find that a Merger Strategy can increase a firm environmental sustainability performance via corporate governance. Moreover, H. Wu and Qu (2021) observe that a Merger Strategy can significantly benefit environmental sustainability innovation. Particularly for firms within an industry with environmental subsidies that also engage in international exploratory and exploitative merger transactions. Correspondingly, Nguyen et al. (2021) also find that a Merger Strategy stimulates environmental sustainability innovation. Namely, the mergers

transactions allow firms to acquire the required resources for environmental innovation. Besides, a Merger Strategy will lead to a larger firm with more resources when a proper knowledge transfer arises (Bresman et al., 2009). Duchin et al. (2022) find that demergers of polluting firms only led to greenwashed environmental sustainability and not actual.

H3: A Mergers Strategy improves a firm's Environmental component of the ESG Score more than a Demerger Strategy.

Although to improve the Social sub-score, a different strategy could be more viable, a Demerger Strategy. The sub-score relates to social sustainability, the human side of sustainability (Hussain et al., 2018). Herein firms are building for a quality society that encourages durable circumstances for human well-being and particularly for vulnerable groups (Rachelle et al. 2016). Social innovation is a complex process mainly involving tacit knowledge, which is difficult to transfer (Mirvis et al., 2016). At the same time, C-suite support is essential for forming a firm's social innovation-related strategies and decisions. This is true because these firm executives support activities related to allocating resources and qualified workers toward social innovation (Hsu et al., 2019). According to Ajmal et al. (2017), improving social sustainability within a firm requires great focus, especially on uncertainties, potential losses, and obligations. Smaller and less diversified firms may have fewer stakeholder demands and less complexity with their size to foster social sustainability compared to larger firms (Strike et al., 2006; Kang, 2012).

H4: A Demergers Strategy improves a firm's ESG Score's Social component more than a Merger Strategy.

Nevertheless, efficient implementation of social and environmental sustainability within a firm is only possible through well-structured corporate governance (Golja, 2012). With this, corporate governance is the control and steering mechanism that ensures the optimum use of a firm's human, physical and financial resources (Claessens & Yurtoglu, 2012; Golja, 2012). There are corporate structures that better facilitate the effectiveness of sustainability innovations than other structures (Wu, 2008). Furthermore, Aras and Crowther (2008) determine that firms with a greater understanding of both sustainability and corporate governance are better capable of addressing these interests successfully.

Interestingly, K. Yang (2003) sees that a demerger transaction improves the corporate control of majority shareholders. However, the author still did not witness the overall corporate governance increase after the demerger. Moreover, Seward and Walsh (1996) observe that a demerger strategy (e.g. spin-off) enables a smoother implementation of efficient internal governance practices post-restructuring. Contrastingly, Teti et al. (2022) find that mergers are an excellent method to improve a firm's business model and performance if there is robust corporate governance in place. Zheng et al. (2021) also find that corporate governance mediates the relationship between mergers and sustainability. Even though, agency theory predicts that weak corporate governance is closely linked with larger and inefficient boards, which leads to weak sustainability performance. Nasih et al. (2019) conclude that larger firms and firms with larger board sizes, which can be achieved with a Merger Strategy, are more likely to have higher sustainability disclosure. Furthermore, Board size positively affects sustainability performance, as they have more diverse knowledge and capabilities (Nguyen et al., 2021). At the same time, mergers often lead to larger board sizes with more diverse stakeholders, which can pressure the firm to improve its sustainability. In sum, this results in the development of the fifth hypothesis:

H5: A Demergers Strategy improves the Governance component of the ESG Score more than a merger Strategy.

Børing (2019) sees that the firm size, measured by the number of employees, has a mediating effect on the positive relationship between firm sustainability and performance. Warrad and Khaddam (2020) say that this is because larger firms can better acquire external funding for activities that help achieve firm objectives. However, they also argue that smaller firms have more freedom to pivot faster to attract the necessary funding. Moreover, the firm's path to becoming sustainable through innovation significantly depends on firm size—both environmental and social sustainability innovation (Børin, 2019). According to Sánchez-Infante Hernández et al. (2020), the mediating effect of innovation appears to be increasing with firm size. Therefore, the larger the firm, the more substantial this effect is on the firm's sustainability performance.

Some studies find that innovation, proxied by firm R&D intensity, is negatively related to the firm size (Kaiser & Licht, 1998). Similarly, Tan (2011) finds a negative relationship between increasing firm size when looking at the quality of the innovation, which is

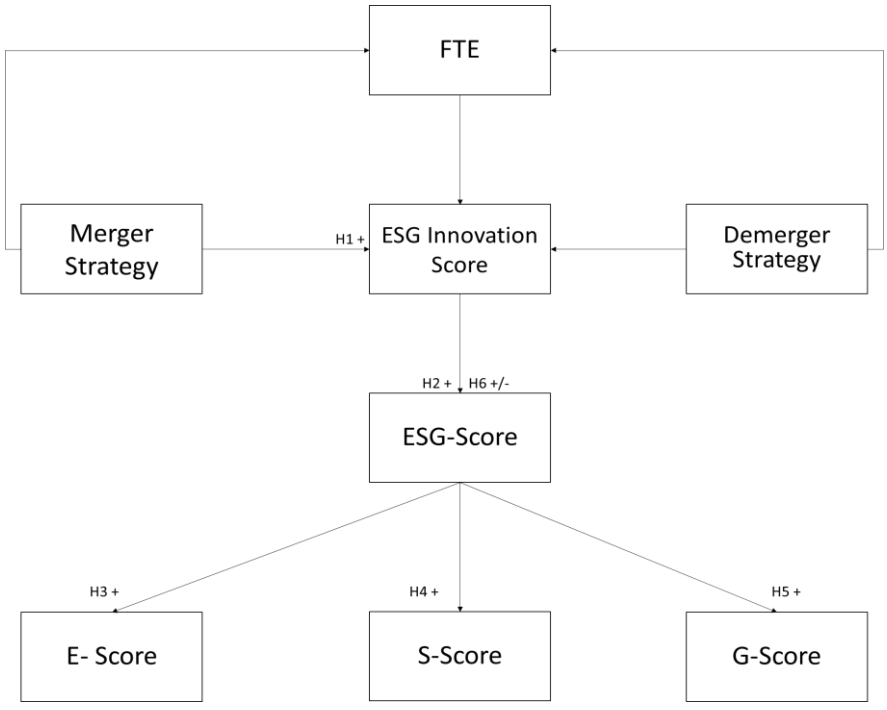
quantified by the number of patent citations. In contrast, Tsai and Wang (2005) observe a U-shape relation between R&D productivity and firm size across various industry sectors. In contrast, J. Li and Wu (2022) find an S-shaped relationship between R&D investment and green innovation post-mergers when studying Chinese firms. Intrestingly, Cefis and Marsili (2015) found when analyzing the effects of M&A on innovation dynamics that firm size is crucial in the "innovation threshold". Herein, M&A increases the threshold for innovation more for large firms and is more observable for innovation output than input. In contrast, smaller firms (SMEs) are more stable with this.

Finally, K. Lee and Roh (2020) studied the effect of proactive divestitures on innovative activities. They concluded that proactive divestiture is an essential strategy for increased corporate sustainability through greater innovation output. Namely, they find that proactive post-divestiture firms have increased R&D inputs but not significantly in output. In addition, this seems to be more significant as the divested-unit size decreases.

H6: There is an inflection point in a firm's size that changes when a Demerger Strategy becomes more beneficial than a Merger Strategy for a firm's ESG Score

The discussed literature and the six created hypotheses have led to this summary model:

Figure 2 summary model of thesis with the according hypotheses 1-6



3. Data & Methodology

3.1 Data

The geographical scope of this thesis extends itself to Europe. More specifically, listed firms in the European Union. Here, Mergers and Demergers are most often seen as a critical strategic option to boost innovation and ESG strategies compared to other regions (Hood, 2022). Moreover, the thesis's observation period spreads from 2010 to 2019, allowing for the longer-term effects of Mergers, Demergers, and sustainability innovation to become observable. Usually, this mechanism can take up to three years and sometimes even five years (Roehl-Anderson, 2013; Feldman et al., 2021). This choice also limits the interference of the potential effects of COVID-19, which started in early 2020 (UN, 2020).

Main Dependent Variables: E-Score, S-score, G-score and ESG Score

As stated before, this thesis uses ESG Score to proxy and quantify a firm's sustainability level. Even though, Dorfleitner et al. (2014) find some evidence for a divergence between the ESG Scores and ESG Risk Scores for specific firms and years across the three most influential sustainability rating providers used by investor managers: ASSET4 database of Thomson Reuters' Datastream, the KLD ratings provided by MSCI ESG STATS and the ESG data set of Bloomberg Sustainability. At the same time, Olmedo et al. (2010) also indicate that the methodology, and thus the ESG Score of ESG rating agencies, vary significantly and lack standardisation. The authors of Olmedo et al. (2010) conclude this based on research consisting of six sustainability indices and ten rating agencies in 2010.

Nevertheless, the Theoretical Framework has established the prevalent use of ESG Scores to measure sustainability by firms and large groups of investors. The choice for using ESG Score is also substantiated by Escrig-Olmedo et al. (2019) as they see that ESG rating agencies have significantly increased the accuracy and robustness of the ESG Scores in the last decade as they have incorporated new criteria into their rating models due to industry dynamics over time. However, a minor drawback of this variable is that Escrig-Olmedo et al. (2019) also found that despite progress in the past decade, ESG rating agencies still struggle to fully integrate all sustainability principles into the sustainability assessment process of the current provided ESG Scores. ESG disclosure has increased significantly in the past years. Such as, the Governance & Accountability Institute found that less than 20% of S&P 500 firms released sustainability reports in 2011. In 2018, this

disclosure figure grew to 86% (Gillan et al., 2021). However, the authors do attest that profound and granular ESG data still remains quite scarce and very challenging to acquire.

There are many ESG providers globally, to be over seventy-four data providers, to be exact (EY, 2022a). The exploding growth of the first years is attributed to the significant increase in environmental regulations that firms need to uphold, especially within the European Union. This led to many small data providers developing their own methodologies to measure ESG. However, a trend of a major consolidation of the ESG data providers in recent years has been observed. In particular, the traditional rating providers, like S&P Global and Moody's, often acquire these smaller players (EY, 2022a). In 2021, 1 billion USD was spent on ESG data (EY, 2022a). In addition, EY analysis of eighty-two EMIA region asset managers shows that asset managers use to up to twelve different data providers, which include Refinitiv, Sustainalytics, MSCI and ISS (EY, 2022b).

Therefore, in this thesis Refinitiv ESG data is used. Besides, several studies like Barros et al. (2022) have used Refinitiv data to perform similar analyses on the effects of M&A on ESG scores. Refinitiv ESG data is sourced from the Eikon terminal from the Erasmus Data Service Centre. Refinitiv has globally one of the most comprehensive ESG databases. They have been producing ESG-related scores since 2002 and currently have ESG Scores of more than 12,000 global firms across 76 countries (Refinitiv, 2022). This coverage equates to almost 85% of the global market cap. The ESG scores from Refinitiv are developed with public company-reported, auditable data collected by over 350 research analysts tasked with collecting ESG data and standardising the data to reduce industry materiality and company size biases (Refinitiv, 2022). The collected data falls into ten major ESG themes: among others, emissions, human rights and shareholder management.

The themes consist of over 630 ESG measures, of which 186 measures are pivotal to comparing performance across industries (Appendix3). First, each of the three components, Environmental, Social, and Governance, are given a weighted score on a 0-100 scale, resulting in E-scores, S-score and G-scores. A higher score relates to relatively higher ESG performance and high transparency in reporting.ESG data. The ESG Score is a weighted average of the three component scores on a 0-100 scale (Refinitiv, 2022). Using the subscores is novel but growing in ESG-M&A literature (González et al., 2020). This results in the main dependent variables: *E_SCORE, S_SCORE, G_SCORE and ESG_SCORE.*

The data gathering process began with enquiring the entire universe of the Asset4 database, which consists of 9338 firms globally. Afterwards, the firms headquartered within the European Union were selected. This resulted in 1187 firms in total. Unfortunately, this sample did not contain firms headquartered in Bulgaria, Croatia, Estonia, Latvia, Lithuania, Malta, and Slovakia. Additionally, some firms had observations missing for one or two years, while a greater group did not have available ESG Scores for a more extended period. This is because firms did not start internally measuring and externally disclosing ESG information to ESG rating agencies until recent years (Abhayawansa & Tyagi, 2021). Therefore, all the firms with missing values (N/A, Blank, 0) for 2011-2020 were removed from the dataset. This resulted in a dataset of 347 firms.

Dependent Variable: Sustainability Innovation

In the analysis of this thesis, innovation is, according to the Theoretical Framework, one of the most prominent channels through which Mergers and Demergers affect firm sustainability, as measured by ESG Scores. However, from inception, a firm's innovation performance has been significantly challenging for scholars to measure (Acs & Audretsch, 2005). The closest researchers have come to solve this fundamental problem and thus measure innovation in a comparable way across industries by utilizing innovation proxies. The most used proxies have relied on the three critical factors in the innovative process: input (R&D expenditures), intermediate outputs (registered patents), and outputs (new products and services) (Acs & Audretsch, 2005).

As also established in the Theoretical Framework, sustainability innovation is significantly different from traditional innovation mostly due to increased complexity and use. Therefore, in this thesis, sustainability innovation is measured by ESG_INNOV. ESG_INNOV is the ESG innovation score that reflects a firm's capacity to reduce its customers' environmental and social costs and burdens, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products. The score is given on a 0-100 scale, whereby a higher score relates to a relatively higher ESG innovation performance of a specific firm. So, this measure clearly relates to the output phase of the innovation process. The data for the variable ESG_INNOV was sourced from the Refinitiv Sustainability Database. This database had full observations from 2010 to 2019 for 337 of the 347 inquired firms of the initial sample.

Main Independent Variables: Mergers and Demergers transactions

The Mergers and Demergers transaction data from the ten years, 2011 to 2020, is sourced from the Refinitiv Database (formerly known as Thomson Reuters Mergers & Acquisitions Database), which is also retrieved from the Eikon terminal at the Erasmus Data Service Centre. The Refinitiv Database records since the 1970s all deal transactions globally that involve changes in the economic ownership of firms. This varies from minority stake purchases to 100% acquisitions (Refinitiv, 2022b). The historical transaction data is gathered from various sources such as financial newspapers, while the data relates to target and acquirer profiles, deal terms, financial and legal advisor background and fees, deal value, premiums, synopsis and deal history (Gugler et al., 2003; Refinitiv, 2022b).

Transactions that are selected as Mergers are transactions whereby the acquiring firm acquires more than 50% of the equity in a target firm. Hereby the ultimate parent of the acquiring firm needs to be one of the 347 firms. The criteria for inclusion of a transaction deal was that the transaction was deemed completed or effective, so not only announced between the 1st of January 2010 and the 31st of December 2019. Another criterion is that the transaction type (M&A Type) only included Disclosed Value and Undisclosed Value. This means it does not matter whether the final price paid for the firm was disclosed publicly or not. Minority Stakes, Leveraged Buyouts, Tender Offers, Recapitalizations, Self-Tenders, Exchange Offers and Repurchases were excluded from the sample enquiry. These selection criteria initially resulted in a sample of 257 firms of the 347 that engaged in Mergers in the observation period from 1st January 2010 to 31st December 2019. Accordingly, the merger transactions were matched yearly for the entire observation period, 2010 to 2019. As a result, 4181 merger transactions are matched with 347 firms.

The main independent variables related to mergers are *NR_MERGERS, CUM_MERGERS, MERGER_STR, and S_MERGER_STR.* Here, *NR_MERGERS* measures the number of merger transactions a sample firm has completed per the above-outlined specifications within a year (2010-2019). *CUM_MERGERS* measures the yearly number of merger transactions firms have completed cumulatively since the 1st of January 2010. Moreover, MERGER_STR indicates whether a firm had a Merger strategy in that specific year. This binary variable returns a one if a firm has completed at least one merger transaction that year. Lastly, S_MERGER_STR only returns a one if a firm has conducted a strictly Merger Strategy and therefore only completed one or more mergers that year and no demerger transactions.

Whereas the transactions selected as Demergers are the transactions in which a firm splits into two or more independent and separately run firms. As a result, only transactions included whereby one of 347 sample firms was the ultimate parent of the target firm being acquired in a Disclosed Value and Undisclosed Value transaction. Additionally, splits-offs, spin-offs, and divestitures transactions of firms that have one of the 347 sample firms as the ultimate parent were also included in the demerger sample. This results in 3392 demergers in the observation period from 2010 to the end of 2019.

Similar variables are constructed for demergers: NR_DEMERGERS, CUM_DEMERGERS, DEMERGER_STR, and S_DEMERGER_STR. With this, NR_DEMERGERS measures the number of demerger transactions a sample firm has completed within a year (2010-2019). *CUM_DEMERGERS* measures the yearly number of demerger transactions firms have completed cumulatively since the 1st of January 2010. Furthermore, DeMERGER_STR indicates whether a firm had a Demerger strategy in that specific year. The variable returns a one if a firm has completed at least one demerger transaction that year. Also, S_DEMERGER_STR only returns a one if a firm has conducted a strictly Demerger Strategy and hence only completed demergers transaction that year and no merger transactions. The two dummy variables BOTH_STR and NEITHER_STR are also created to indicate whether a firm has used both a Merger Strategy and a Demerger Strategy or neither in a given year. The former variable is notably important to form the analysis's control group.

Intrestingly, Gugler et al. (2003), Tampakoudis & Anagnostopoulou (2020), and Barros et al. (2022) all source Refinitiv for both ESG Score data and transaction data in their analysis of M&A on ESG Score, this greatly solidifies the data sourcing choice in the thesis.

Control Variables: Financial Variables

The goal of this thesis is to determine whether there is a causal relationship between corporate restructuring (mergers and demergers) and firm sustainability (ESG Scores); Therefore, control variables are introduced in the analysis to increase the validity of the effects of the main variables and reduce bias caused by the unobservable heterogeneity (Zhang et al., 2020; Hünermund & Louw, in press). So, this thesis uses several widely used control variables from relevant literature on par with prior studies with similar research questions Gugler et al. (2003), Cefis and Marsili (2015),Tampakoudis & Anagnostopoulou (2020), Zhang et al. (2020) Barros et al. (2022) and Di Simone et al. (2022), among others.

Financial control variables, like firm revenue, are also utilised in the analysis. These variables are in the literature commonly associated with affecting mergers and demergers (Barros et al., 2022). Hence, *REVENUE* measures the amount of turnover or sales a firm has generated in a specific year expressed in millions of euros. Second, *CAPEX* is a firm's expenditure on buying, maintaining, or improving its fixed assets in a specific year expressed in millions of euros. Finally, *PROFIT* measures the amount of profit, in other words, net income a firm has produced in a specific year expressed in millions of euros. The data relating to these variables are sourced from the Refinitiv Equities Database. However, there were some missing observations for some variables for the observation period, 2010-2019. This reduced the number of sample firms to 320 firms in the sample.

Control Variables: Non-Financial Variables

COUNTRY and *SECTOR* are used to control for the variation of the level of technology, sectoral specificities, and opportunity conditions for factors such as capital and innovation available in a specific country or sector. The control variable *COUNTRY* returns the country where a specific firm is headquartered. While the *SECTOR* provides the Industry Classification Benchmark (ICB) name in which a specific firm operates. The data for the control variable is sourced from Refinitiv from 2010 to 2019. Resulting from their ESG and sustainability innovation study, Zhang et al. (2020) believe that firm age must also be controlled in such analyses. Therefore, in the thesis, *FIRM_AGE* is the number of years a firm has been active on the market in a specific year since its founding. The observations of the years 2010 to 2019 are sourced from Refinitiv.

Tampakoudis and Anagnostopoulou (2020) and Zhang et al. (2020), who researched the M&A - ESG and ESG Innovation - Firm Value relations, contend that controlling for firm size is essential. Therefore, although both papers use total assets as a proxy for firm size, this thesis will also use another widely used variable in corporate finance literature (Dang & Li, 2013). *FTE* represents the number of full-time and full-time equivalent employees (part-time or temporary employees) that is reported by a firm at the end of a specific year. Nevertheless, Hashmi et al. (2020) argue, based on previous studies and their own study that examined the impact of different measures of firm size on seven corporate finance practices, that a proxy that is more related to the concept being investigated should be used when examining firm size in relation to that practice. Hence, *ASSETS* is also used in this thesis, which denotes the value of total assets a firm has in position a specific year

expressed in unit euros. Unfortunately, many sample firms are missing observations for some observation years. As a result, the sample size would drop significantly below 300 firms. Therefore, this thesis chooses to run both proxies of firm size in separate analyses.

The Introduction discusses that firms have experienced increased external and internal pressures in recent years, urging them to change their strategies to become more sustainable. White (2009) researched the integration of sustainability in a firm existing core strategy and found that few key factors equate to integration success. Namely, firms should be explicit about their sustainability strategy definition and its priority. However, at the same time, the strategy should not lead to additional work and should not come at the detriment of firm performance and value. Moreover, Wijethilake (2017) finds that a proactive sustainability strategy positively relates to a firm's sustainability performance.

At the same time, Engert and Baumgartner (2016) studied how firms can bridge the gap between formulating and implementing a firm sustainability strategy. The authors conclude that commitment to the sustainability strategy is one of the most vital factors for obtaining a successful sustainability strategy. Therefore to account for the firms that have committed to proactively transforming their strategies to become more sustainable, the binary variable *ESG_STR* is used. With this, the variable *ESG_STRA* only notes a value of 1 when a firm has a dedicated ESG committee or team at the board level or the senior management level responsible for decision-making on the firm's corporate ESG strategy. The data for the *ESG_STR* variable is sourced from the Refinitiv Sustainability Database.

So far, a robust dataset has been constructed containing 302 sample firms across 27 variables. However, as mentioned before, innovation is a critical mediating channel in the analyses of this thesis. Namely, firms with bolder sustainability goals need more and more radical innovation to achieve this (Klewitz & Hansen, 2014). Thus, an additional variable should be introduced into the analyses that specifically captures this "input effect " of the innovation process in the analysis. Additionally, the measure should be interpretable for cross-industry comparisons. Since the 1950s, it has become adequate for scholars of economic research to use R&D expenses to proxy innovational input (Acs & Audretsch, 2005). As a result, *RD* measures the amount a firm spends on the research and the development of new products or services in a specific year, expressed in millions of euros. This variable data is sourced from Refinitiv. However, unfortunately, this source and

other credible sources panned out to be quite incomplete for most of the sample firms for the whole observations period, 2010 to 2019. The firms that lacked to report R&D expenses were mostly financial service providers. However, contrastingly, these banks and insurancers were among the most vocal about the importance of research and development in their annual reports and on their websites (Bankinter, 2015; ING, 2022).

Here, they detail how the firms support innovation efforts through innovation funds and research centres (Bankinter, 2022). These firms also have dedicated equity research units that study other firms' R&D expenses and behaviours towards innovation (BBVA, 2022). Intrestinlgy, Barros et al. (2022) decided to exclude all the firms in the financial service sector from the sample in their M&A-ESG research, as they argue these were firms that did not have data for all the control variables in Refinitiv. This thesis, however, does not decide to remove the firms in the financial sector to keep the sample size large enough. Consequently, some of the R&D data is (manually) searched and sourced from other credible available data sources, such as Orbis, Computstat and published annual reports.

Other studies also had difficulties finding R&D data on financial service firms. Traditionally, service firms such as banks, insurance, retail and media have been associated with low R&D data disclosure. For example, banks often do not directly account for R&D expenditures in their financial statements but often include them in their overhead expenses (Simpson & Kohers, 2002). Moreover, (Miles, 2007) also concludes that service firms use less R&D than expected for innovation. At the same time, the innovation that happens stays undocumented in R&D surveys, as they use other methods. Nevertheless, this thesis decides to use *RD*, as the variable is too crucial for the fundamental analyses to be dropped. In the end, 283 sample firms are in the final dataset.

Table 1 Variables of the Final Dataset

Variable	**Variable**	**Variable**	**Variable**	**Variable**
COUNTRY	S_DEMERGER_STR	S_SCORE	CUM_DEMERGERS	FTE
SECTOR	BOTH_STR	G_SCORE	R&D	ASSETS
MERGER_STR	NEITHER_STR	NR_MERGERS	PROFIT	FIRM_AGE
S_MERGER_STR	ESG_SCORE	CUM_MERGERS	REVENUE	ESG_INNOV
DEMERGER_STR	E_SCORE	NR_DEMERGERS	CAPEX	ESG_STR

3.2 Methodology

This master thesis relies on several analyses to determine whether a merger or demerger transaction has a comparatively better effect on firm sustainability. Each analysis relates to the six developed hypotheses. The first five hypotheses use five distinct sustainability proxies, starting with an innovation measure of ESG and carrying on with its separate components. The sixth hypothesis tests the efficacy of each strategy at varying firm sizes. Additionally, a robustness check analysis is done. Finally, based on the results, a conclusion is drawn. The modelling tool used for running all the analyses is the statistical software Stata/MP 17, the latest and most powerful version of Stata to date (Stata, 2022).

Moreover, several empirical methods are used to test the developed hypothesis and answer the main research question. First, close to Tampakoudis and Anagnostopoulou (2020), Barros et al. (2022), and similar to Scoop (2021), in which the author researched the effects of a Corporate Venture Capital Strategy on ESG Scores, initial Pooled OLS models are run. A Corporate Venture Capital Strategy is a strategy that somewhat belongs on the same spectrum as the Merger Strategy. The most evident differences are the maturity, the smaller size of the targets and the acquirer's stakes in the targets, which is often significantly smaller than the Mergers Strategies' 50% threshold (Scoop, 2021). At the same time, Pooled OLS analysis is also used in the studies related to analyzing (ESG-related) demergers, such as Bergh and Holbein (1997) and (Bams & van der Kroft, 2022.) However, in this thesis, the Pooled OLS models are only used as base models to understand how the variables interact in the panel with each other and for basic interference. Namely, a strong indication of endogeneity and unobserved heterogeneity exists in the proposed analysis: unobserved factors that may affect the dependent ESG measures that simultaneously correlate with the independent variables. Even though well-liked, the validity of the Pooled OLS models may suffer for more concrete use cases.

Therefore, in line with the Limitations and Future Research section of Scoop (2021) and on par with methods used by Szücs (2012) and Tampakoudis et al. (2021), a Difference-in-Difference (DiD) methodology is considered for more advanced analysis in this thesis. The most latter used DiD to conduct a COVID-19 replication of their analysis on the effect of ESG on value creation from mergers and acquisitions. That Difference-in-Difference is popular for ESG innovation research is exemplified in The Impact of Mergers on Green Innovation by Da Cruz and Newham from the Centre of Economic Research at ETH Zurich.

The authors of "The Impact of Mergers on Green Innovation" have been contacted for a knowledge exchange regarding this thesis, but they have not yet finished a sharable working version. **Link to abstract:** The Impact of Mergers on Green

Also, event studies are often used in M&A - ESG and M&A - Sustainability Innovation research as an advanced methodology when increased validity is sought. Examples include Gugler et al. (2003) and Teti et al. (2022). Event studies are also performed in the research of demergers on innovation and ESG (Brauer & Schimmer, 2010; Monaco, 2022).

So more specifically, a Staggered Difference-in-Difference analysis following Callaway and Sant'Anna (2021) and Callaway et al. (in press) is performed to combine the benefits of the two advanced methods. Namely, Callaway and Sant'Anna (2021) and Callaway et al. (in press) have developed a very unique application of the more traditional Canonical Difference-in-Difference method that adopts many of the desired features of two-way fixed-effects event-study regressions (TWFE), but without some of the key disadvantages.

They argue that there are three reasons why empirical research often deviates from the canonical setup of DiD. Firstly, researchers typically have access to more than two periods. Secondly, Treatment may occur at different points in time. Thirdly, groups may be other in terms of observed characteristics and covariates X (Callaway and Sant'Anna (2021). Whereas when two-way fixed-effects event-study regressions are used, the β TWFE is frequently interpreted as the causal parameter of interest. However, this is not always factual (de Chaisemartin & D'Haultfœuille, 2020). In addition, dynamic variations of the TWFE specification with lead and lag event study dummies wrongfully rely on the γ's to be interpreted as reliable measures of the dynamic treatment effects (Abraham & Sun, 2018). In sum, the two methods are too dependent on variations in treatment status.

This also seems true in this thesis. Namely, the firms have mergers and demergers transactions (treatments) throughout the whole observation period from 2010 to 2019, 10 periods. The solution that Callaway and Sant'Anna (2021) and Callaway et al. (in press) come up with only exploits the correct variations for causal inference. Based on a random sample, they develop "treatment start-time dummies" that can interact with staggered treatment adoptions (MERGER_STR and DEMERGER_STR) and then is compared by the group that is never-treated (NEITHER_STR) or not not-yet treated groups. Consequently, they attempt to minimize the parallel trends assumptions by identifying the ATT(g, t), as this parameter allows for interpretation of the treatment effect heterogeneity. Therefore, a Staggered Difference-in-Difference makes it possible to develop a DiD model with multiple time periods while creating the possibility for a continuous treatment to be used.

Furthermore, to test the sixth hypothesis, it is imperative that the empirical method can explicitly account for the different firm sizes of the sample firms there are in the analysis. Hence, the same as in Zhang et al. (2020), that researched the interaction effect between ESG and green innovation and its impact on firm value, in the thesis, a Quantile Regression is also used. More specifically, Zhang et al. (2020) selected five quantiles: 0.1, 0.3, 0.5, 0.7 and 0.9, for empirical testing of firm performance. The exact same quantiles are used to separate the effects of mergers and demergers at the distinct firm sizes proxied by FTE.

Descriptive statistics

The first dataset used in the initial empirical analyses is called FULL_NoR&D-302. It is a balanced dataset with panel data on 302 observations firms and 27 variables. With this, the panel variable is ID, the time variable is YEAR (2010 to 2019), and the delta is one year. This dataset is used in the analyses that help to test the six hypotheses and answer the main research question. The second dataset is FULL_NOASSETS-283. The difference from the latter dataset is the inclusion of the variable R&D and the exclusion of 18 incomplete observations. This balanced dataset consists of 283 observations firms and 28 variables. Before running the models, descriptive statistics are performed on the datasets: summary statistics tables, frequency tables, histograms, and pairwise correlation tables.

Pooled OLS

The Pooled OLS models are developed to test hypotheses 1-5. Barros et al. (2022) used robust standard errors for firm *i* and year *t* in the period between 2002 and 2020 when estimating their Pooled OLS specification models. This was done to combat heteroskedasticity when analyzing the effect of M&A on the acquiring firms' ESG scores.

The research question of this thesis is whether a Corporate Restructuring Strategy improves a firm's ESG Score via innovation. The Theoretical Framework established that a high level of sustainability innovation is needed for firms to increase their ESG performance. Therefore, the first Pooled OLS model in this analysis, MODEL 1.A.1, uses the dataset FULL_NOR&D-302 and regresses with robust standard errors the dependent variable *ESG_INNOV* against the independent variables *NR_MERGERS, CUM_MERGERS, MERGER_STR, S_MERGER_STR, NR_DEMERGERS, CUM_DEMERGERS, DEMERGER_STR, S_DEMERGER_STR*; the time in-variant control variables *COUNTRY, SECTOR*; the time variant control variables *REVENUE CAPEX, PROFIT, FTE* and *ESG_STRA* with this equation:

(1.A.1)

$$\text{ESG\_INNOV}_{it} = \beta_0 + \beta_1 Independent\ Variables_{it} + \beta_2 TimeInVariant\ Control\ Variables_i + \beta_3 TimeVariant\ Control\ Variables_{it} + u_{it}$$

MODEL 1.B.1 uses *ESG_SCORE* as the main dependent variable instead, which is the fundamental sustainability measure of interest in this thesis. Namely, it is stated as the proxy of sustainability in the main research question. Additionally, it tests Hypothesis 2:

(1.B.1)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 Independent\ Variables_{it} + \beta_2 Time\ InVariant\ Control\ Variables_i + \beta_3 TimeVariant\ Control\ Variables_{it} + u_{it}$$

The third hypothesis states that a Mergers Strategy improves the Environmental component of the ESG Score more than a Demerger Strategy. Following this, MODEL 1.C.1 uses *E_SCORE* as the dependent variable outcome. This results in the following equation:

(1.C.1)

$$\text{E\_SCORE}_{it} = \beta_0 + \beta_1 Independent\ Variables_{1it} + \beta_2 Time\ InVariant\ Control\ Variables_{2i} + \beta_3 Time\ Variant\ Control\ Variables_{3it} + u_{it}$$

The fourth hypothesis contends that a Demergers Strategy improves the ESG Score's Social component more than a Merger Strategy. Therefore, MODEL 1.D.1 uses *S_SCORE* as the dependent variable outcome. This results in the following alteration in the equation:

(1.D.1)

$$\text{S\_SCORE}_{it} = \beta_0 + \beta_1 Independent\ Variables_{1it} + \beta_2 Time\ InVariant\ Control\ Variables_{2i} + \beta_3 TimeVariant\ Control\ Variables_{3it} + u_{it}$$

MODEL 1.E.1, relates to Hypothesis 5, which has the same premise as Hypothesis 4 but uses *G_SCORE* as the dependent variable outcome. As a result, changing this equation in:

(1.E.1)

$$\text{G\_SCORE}_{it} = \beta_0 + \beta_1 Independent\ Variables_{it} + \beta_2 Time\ InVariant\ Control\ Variables_i + \beta_3 Time\ Variant\ Control\ Variab\ les_{it} + u_{it}$$

Now that a base model has been established, the key potential channel of R&D remains unexplored. Thus, the next models use the dataset FULL_NOASSETS-283 and regress the same plethora of ESG measures as the dependent variable against the independent variables *NR_MERGERS, CUM_MERGERS, MERGER_STR, S_MERGER_STR, NR_DEMERGERS, CUM_DEMERGERS, DEMERGER_STR, S_DEMERGER_STR*; the time non-varying control variables *COUNTRY, SECTOR*; the time-varying control variable *REVENUE CAPEX, PROFIT, FTE*, *ESG_STRA* and *RD.* This leads to the expansion of five new OLS models (Appendix4).

In this next section, some additions and alterations are made to the currently used variables to improve the validity of the Pooled OLS models. The variable transformations are based on significant findings in the academic literature related to the current analysis.

For example, as discussed in the Data section and the Theoretical Framework, possible synergies and knowledge transfer accruing post-merger transactions take a few years to crystalise. More specifically, the full implementation of a merger or acquisition usually takes three years in almost 70% of cases, according to Feldman et al. (2021). Whereas Barros et al. (2022), which used a panel of firms across 41 countries and 12 economic sectors between 2002 and 2020, found a delayed effect of merger transactions on ESG Scores. Namely, in the transaction year, no effect was found. They only found a significant positive effect of the merger transaction on the firm's ESG Score in the year following the merger transaction. Moreover, this positive delayed effect on the ESG score was found for each of the independent sub-scores: E-Score, S-Score and G-Score.

Therefore, to account for this delayed mechanism of mergers, time lags are added to the variables that estimate the use of a Demerger Strategy. A 3-year time lag (*3lag*) is introduced. In comparison, the effects of a Demerger transaction are more immediate. The selling firms can namely quite quickly start focusing on other matters once the demerger transaction has been completed (John & Ofek, 1995; Dittmar & Shivdasani, 2003). Thus, a time lag is not introduced for the variables related to a Demeger Strategy.

Additionally, there probably is an interaction effect of research and development with each of the two strategies being analysed. First, Y. Zhang et al. (2018) find that a merger transaction can lead to synergies and knowledge-sharing opportunities between firms in

the R&D domain, consequently lower R&D costs. The authors again argue that the complementary effects can lead to better R&D turnover. Second, Lee & Roh (2020) empirically found that firms that use a proactive divestiture strategy, in other words, a Demerger Strategy, significantly increase their R&D input and consequently improve their R&D output after the transaction. They find this especially true for firms in the high-tech sector, as these firms use the freed-up resources towards increased sustainability innovation efforts. Thus, there is a combined effect between the variables. The interaction terms *RD*3lag NR_MERGERS* and *RD*NR_DEMERGERS* are hence produced to proxy this.

On par with Tampakoudis and Anagnostopoulou (2020), the variables that, based on their histogram (Appendix23), suffer from significant skewness are normalized to reduce the effects of outliers by a log transformation. These observations led to *RD* (961 missing values generated), *PROFIT* (227 missing values generated), *REVENUE, CAPEX* (17 missing values generated), and *FTE* being log-transformed in five different models (Appendix5). Lastly, similar to K. Lee & Roh (2020), another set of interaction terms is introduced to determine the possible effects of the firm size in the thesis' strategy choice dichotomy and pre-orientate testing hypothesis 6. *FTE*3lagNR_MERGERS* and *FTE*NR_DEMERGERS* are thus used to observe whether firm size acts as a moderator (Kenny, 2007)(Appendix6).

Staggered Difference-in-Difference

The more advanced analysis of the first five hypotheses relies on the new Staggered Difference-in-Difference with dynamic treatment effects by Callaway & Sant'Anna (2021). Even though their paper covers both repeated-cross section and panel data, in this thesis it is considered that a random sample of balanced panel data is used with the next notation: {(Yi,1,Yi,2, . ,Yi,T , Di,1, Di,2, . . . ,Xi, Di,T)} n i=1. The parameter of interest in the models of Callaway and Sant'Anna (2021) is the Average Treatment Effect on the Treated. In the thesis, this is the Average Treatment Effect on the firms with a merger or demerger:

$$ATT(g, t, d|g, d) = E[Yt(g, d) - Yt(0)|G = g, D = d] \text{ for } t \geq g - \delta.$$

Herein, G is "Treatment start-time dummies" and Gi,g = 1 if unit i is first treated at time g, and zero otherwise. This means that cohorts are created to group firms that participated in Mergers of Demergers (treated) and firms that did partake in neither (non-treated) in each period. D is staggered treatment adoption, and Di,t = 1 with Di,t = 1 ⇒

Di,t+1 = 1, for t = 1, 2, . . . , T if unit i is treated in period t, and 0 otherwise (Callaway & Sant'Anna's, 2021). In other words, once a firm has implemented a Merger or Demerger, the firm will always be considered treated. The covariates are normally time in-variant. Still, time-varying covariates can be included in models as long it is measured before treatment takes place. This is solved by Stata, which uses the time g minus one (T_{-1}) value of the covariates until the baseline period (before treatment) (Callaway & Sant'Anna, 2021). So, the post-treatment values are ignored. The conditional parallel assumption is a bit relaxed: each t ∈ {2, . . . , T }, g ∈ G such that t ≥ g − δ, E[Yt(0) − Yt−1(0)|X, Gg = 1] = E[Yt(0) − Yt−1(0)|X, C =1](Callaway & Sant'Anna's, 2021). Lastly, the generalized propensity score is uniformly bounded away from 1, as it creates inference problems when it approaches 1 (Callaway & Sant'Anna, 2021). Namely, this assumption follows Lee and Little (2017), who propose that propensity score weighting on odds leads to the ATT.

The parallel assumption is tested with the Stata command "estat pretrend". This estimates the chi2 statistic of the null hypothesis that all pretreatment ATT(g, t)'s are equal to zero. The estimation process itself consists of two steps. The first step uses the Stata command "csdid" to estimate the ATT(g,t) for all cohorts with the improved doubly robust DiD estimator based on the inverse probability of tilting and weighted least squares following Sant'Anna and Zhao (2020) (Appendix29). Subsequently, the second step uses the Stata command "estate event" to estimate the ATT by time periods before and after treatment.

Moreover, the same models are rerun with *MOST_MERGERS* and *MOST_DEMERGERS*, returning the years in which the firms had the most merger and demerger transactions, respectively (Appendix9-10). This is done to test if there are cumulative or critical mass effects, as tested in the previous few Pooled OLS models with *CUM_MERGERS* and *CUM_DEMERGERS.* However, a limitation of Staggered DiD is that it can only successfully integrate a limited number of covariates. When the number of covariates increases, so does the number of omitted pairs due to overfitting of the model, which in turn again lowers the validity of the analysis. Therefore, only the three most essential control variables are supplemented in the models. The observed variable's magnitude and significance level in the previous Pooled OLS models (Table A28-A47) and the academic literature determine the control variables. Even though deemed as a crucial control variable *ESG_STR* could not be included. In the end, *RD*, *PROFIT* and *FTE* were selected to be regressed with the same dependent variables as the prior models (Appendix11-12).

Quantile Regression

Hypothesis 6 hypothesized an inflection point in a firm's size in which a Demerger Strategy becomes more beneficial than a Merger Strategy for a firm's ESG Score. Quantile regressions are thus run to test this hypothesis. (A formal) quantile regression is a set of regressions with a dependent variable at varying quantiles. It is very similar to an OLS regression. However, it has less strict assumptions and uses the conditional median instead of the mean when running. MODEL 3.B.1 regresses the 0.1, 0.3, 0.5, 0.7 and 0.9 quantile values of *FTE* as the dependent variable against the independent variables MERGER_STR*ESG_SCORE and DEMERGER_STR*ESG_SCORE with the control variables *RD*, *PROFIT, REVENUE*, *CAPEX*, *FIRM_AGE* and *ESG_STR* (Appendix13). However, this actually tests the interested casual relationship in the reverse order. Hence, only the association effect between *FTE* and the two strategy variables can be used for the analysis.

Therefore, so-called "non-formal" quantile regressions are also performed in the thesis involving the Stata command "xtile", which divides *FTE* into quantiles. This essentially is an adapted Pooled OLS model with an independent variable divided into quantiles. MODEL 3.B.2 regresses ESG_SCORE as the dependent variable against the independent variables *Quantile_FTE * MERGER_STR* and *Quantile_FTE * DEMERGER_STR* (also *Quantile_FTE, MERGER_STR* and *DEMERGER_STR* separately) with control variables *RD*, *PROFIT, REVENUE*, *CAPEX*, *FIRM_AGE*, *ESG_STR, COUNTRY_D* and *SECTOR_D* (Appendix14). With this, *Quantile_FTE* with the suffixes 2-5 are the 0.3, 0.5, 0.7 and 0.9 quantiles of *FTE.* Namely, the 0.1 quantile of *FTE* is already in the base model. Furthermore, MODEL 3.B.3 reruns the same model, but now the control variables are log-transformed (Appendix15).

Lastly, Hashmi et al. (2020) argue that a firm's total assets are also an adequate measure of a firm's size in corporate finance research. In this thesis, *ASSETS* may also be a better proxy for firm size. Therefore, a robustness check with *FULL_271* is done with the same quantile regressions models but with *ASSETS* as the proxy for firm size (Appendix16-17).

Table 2 summary of the empirical models used in the thesis

	Pooled OLS	**Staggered DiD**	**Quantile Regression**
ESG_INNOV	1.A.1-1.A.4	2.A.1-2.A.6	
ESG_SCORE	1.B.1-1.B.4	2.B.1-2.B.6	3.B.1-3.B.5
E_SCORE	1.C.1-1.C.4	2.C.1-2.C.6	
S_SCORE	1.D.1-1.D.4	2.D.1-2.D.6	
G_SCORE	1.E.1-1.E.4	2.E.1-2.E.6	

4. Results

Descriptive Statistics

Four sets of descriptive statistics are performed on FULL_NoR&D-302, FULL_NOASSETS-283 and FULL-271, with 302, 283 and 271 firms in each of the corresponding datasets. Firstly, the summary statistics results can be found in Appendix18 (TableA1 – TableA3). The Mean, Standard Deviation (SD), Minimum (Min), and Maximum (Max) and the number of observations (Observations) of the variables of each model are given and it can be established that the Mean of the ESG_SCORE of the sample firms is relatively stable across the three datasets at 61.94, 61.97, and 62.36. Moreover, each ESG sub-scores are also relatively equal across the dataset but vary more significantly between firms. For example, in FULL_NoR&D-302, the minimum E-Score is .77, and the maximum is 93.44 (Mean 64.90). The number of mergers per firm per year is between 0 and 36. For demergers, this maximises at 21. The mean profit of the sample firms is around 12 billion euros. The other firm's characteristics are pretty diverse. For instance, the smallest firm in the sample has 34 FTE employees, compared to the largest with 611020 (SD 69994.74).

While the frequency tables are observable in Appendix19-21 (Table A4 -A24), based on these frequency tables, around 82 % of all firms in all three datasets have a dedicated ESG strategy. About 41% of firms in a given year have a mergers-focused strategy, whereas only 14% have a strictly mergers-focused strategy. In contrast, a little more than 1/3 of firms carried out demergers as part of their corporate strategy. Less than 9% of the sample firms used a strictly demerging strategy— while a little over a quarter of all firms engaged in both transactions yearly. At the same time, 50% of firms did not engage in either mergers or demergers within the entire observation period from 2010 to 2019.

Thirdly, Appendix22 (Table A25 – Table A27) displays the pairwise correlation tables. Herein, correlations with a 5% significance level are denoted by an asterisk (*). Potential cases of multicollinearity can be noticed when there is a high correlation between two independent variables. Surprisingly, in *FULL_NoR&D-302*, the ESG measures of interest only have a small correlation (Cohen, 1988) with *MERGER_STR* (0,16 to 0,22) and *DEMERGER_STR* (0,18 to 0,27). While there is a strong correlation between *NEITHER_STR* and *ESG_INNOV* (0,53). The histograms of the control variables ex-ante and -post-log-transformation are in Appendix23. The variable's distributions are now more normalized.

Pooled OLS

A total of twenty Pooled OLS were developed to initially test the first few hypotheses. The first five models applied the dataset *FULL_NOR&D-302* and regressed the dependent variables *ESG_INNOV, ESG_SCORE, E_SCORE, S_SCORE,* and *G_SCORE* (MODEL 1.A.1-MODEL 1.E.1) against the primary list of independent variables, time-in-variant control variables and time-variant control variables, that was elaborated on in the Methodology.

MODEL 1.A.1 (Appendix25, Table A28), which regresses on *ESG_INNOV,* returns a positive coefficient of 1.664 for *MERGER_STR*. However, the effect is not significant at the 10% significance level. On the other hand, *DEMERGER_STR* returns a positive coefficient of 5.537, which is significant at the 1% significance level. Thus, in this model, a firm, keeping all else equal, that uses a demerger-focused strategy has a 5.537 higher ESG innovation score compared with a firm with a different strategy. In this case, a Demerger Strategy increases a firm's capacity to create new environmental technologies, processes or eco-designed products. So, based on the initial observation of MODEL 1.C.1, H3 should be rejected. Other positive results in this model are the positive effects of *REVENUE* (.0003765), FTE (.0000345) and *ESG_STR* (5.156) at a 1% significance level. In addition, every year a firm has been longer active on the market relates to a .006 higher sustainability innovation score at a 5% significance level. This model has an R^2 of 0.391.

In the same line, MODEL 1.B.1 (Appendix25, Table A29) can be interpreted, which uses *ESG_SCORE* as the primary dependent variable. Noteworthy, this model shows that having a strategy that engages in both mergers and demergers as a firm can improve a firm's ESG Score by almost two points within the firm's ESG_Score in total (1.978). This effect is significant at a 5% significance level. In contrast, not engaging in either mergers or demergers relates to lower firm sustainability at a 4-point lower *ESG_SCORE*, significant at a 1% significance level. Again, *ESG_STR* seems to have quite a significant effect on the ESG_SCORE. Furthermore, maybe this indicates the compounding learning effects of having done continuous mergers (Collins et al., 2009). Moreover, increased M&A experience can also improve a firm's ability to transfer knowledge post-merger (Roehl-Anderson, 2013). Strangely, an increased number of mergers does seem to decrease the *ESG_SCORE* in this model. Thus, H2 should be rejected. Other financial control variables are also positive and significant in this model: *PROFIT* and *REVENUE*. A similar finding was found by Tampakoudis and Anagnostopoulou (2020). This model has an R^2 of 0.344.

H3 states that a Mergers Strategy improves the Environmental component of the ESG Score more than a Demerger Strategy. MODEL 1.C.1 (Appendix25, Table A30) tests this hypothesis by regressing *E_SCORE* as the dependent variable outcome. This model finds that a strategy and strictly merger could increase the E_SCORE by 1.96 and 3.236. Yet, only *S_MERGER_STR* is significant at the 5% significance level. Still, *DEMERGER_STR* and *NR_MERGER_STR* have a coefficient of 5.44 and -.535 at a 1% significance level. Thus, rejecting H3. The control variables again return familiar results. The model's R^2 is 0.487.

MODEL 1.D.1 (Table A31) with an R^2 of 0.437 uses *S_SCORE* to test H3. *DEMERGER_STR* (4.165) has a slightly larger positive and more significant effect on *S_SCORE* than *S_MERGER_STR* (3.164) and the insignificant *MERGER_STR.* Still, a higher number of demerger transactions has a slightly more negative effect than mergers on social sustainability. Both are significant at the same significance level. This may indicate the Conn et al. (2004) described hubris-mean reversion-diminishing returns trifecta. They witness this trifecta of effects with firms engaged in many M&A transactions. Thus, H4 should not be rejected. MODEL 1.E.1 (Table A32) with an R^2 of 0.233, has a significantly positive of effect *CUM_DEMERGERS* on *G_SCORE*, the only relevant effect, not rejecting H5.

The main results of the Pooled OLS Models can be found summarised in Table 4. All the models have R-squares on par with relevant ESG studies with comparable research setups (Xie et al., 2018; Tampakoudis & Anagnostopoulou, 2020). This solidifies the results. The elaborated models (1.A.2-1.E.3) corroborate but also deviate somewhat from the initial conclusions above. Remarkably, especially having a dedicated team that can make the decisions regarding a firm's sustainability seems to be significant in increasing a firm's sustainability level. This can be witnessed for all ESG measures across almost all Pooled OLS models. Initial evidence for H6 is found in Table 3. A Demerger Strategy has a strong and significant positive effect on four ESG measures when firm size (logFTE) increases.

Table 3 Pooled OLS Regressions partial results for two variables 1.A.4 - 1.E.4

	Model	**logFTE*lag3MERGER_STR**	**logFTE* DEMERGER_STR**
ESG_INNOV	1.A.4	1.173	1.322***
ESG_SCORE	1.B.4	.475	.528**
E_SCORE	1.C.4	.597	.662***
S_SCORE	1.D.4	.617	.684**
G_SCORE	1.E.4	.761	.901

Table 4 The Main Results of the Pooled OLS Models with *** p<.01 ** p<.05 * p<.1

		REVENUE	logREVENUE	CAPEX	logCAPEX	FTE	logFTE	FIRM_AGE	ESG_STR	logRD* lag3MERGER_STR	logRD* DEMERGER_STR	COUNTRY_D	SECTOR_D	Constant	R-squared
ESG_INNOV	1.A.1	.00038***		-.00035		.0000345***		.006**	5.156***			YES	YES	43.559***	0.391
	1.A.2	.00041		-.00040		.000243		.0029979	2.809			YES	YES	4.867.452	0.396
	1.A.3		4.31**		5.543***		.338	.012***	4.85**	-0,24	-1.266	YES	YES	-19.561	0.417
ESG_SCORE	1.B.1	1.46e-07***		-6.44e-08		.000016 1		.005**	4.643**			YES	YES	43.096***	0.351
	1.B.2		4.377***					.006***	5.156***			YES	YES	40.214***	0.526
	1.B.3		4.389***		1.038**		-1.713**	-.005***	11.432***	-.179	-.218	YES	YES	40.214***	0.396
E_SCORE	1.C.1	.000281***		-.0007***		-1.01e-07		.006***	11.378***			YES	YES	38.69***	0.526
	1.C.2	.0002983***		-.0005688***		8.36e-06		0.000058	12.442***			YES	YES	41.286***	0.494
	1.C.3		5.751***		3.09***		-3.252***	008***	14.016	-.227	-.502**	YES	YES	.25	0.524
S_SCORE	1.D.1	.0001521***						.008***	13.974***			YES	YES	36.523***	0.526
	1.D.2	.00013***		.00032		.000031***		-.002	10.591***			YES	YES	36.77***	0.441
	1.D.3		1.516		.573		2.883**	.002	11,307***	.189	.125	YES	YES	-14.995	0.475
G_SCORE	1.E.1	.0000511		-.00069**		.000018**			9.799***			YES	YES	37.647***	0.233
	1.E.2	.0000882**		-.000974***		.000016**		-.003	9.778***			YES	YES	41.029***	0.239
	1.E.3		2.083***		-.372		-4.148***	.006**	9.014***	-.501**	-.429**	YES	YES	13.343*	0.324

Full models are found in Appendix25-28

		REVENUE	logREVENUE	CAPEX	logCAPEX	FTE	logFTE	FIRM_AGE	ESG_STR	logRD* lag3MERGER_STR	logRD* DEMERGER_STR	COUNTRY_D	SECTOR_D	Constant	R-squared
ESG_INNOV	1.A.1	.00038***		-.00035		.0000345***		.006**	5.156***			YES	YES	43.559***	0.391
	1.A.2	.00041		-.00040		.000243		.0029979	2.809			YES	YES	4.867.452	0.396
	1.A.3		4.31**		5.543***		.338	.012***	4.85**	-0,24	-1.266	YES	YES	-19.561	0.417
ESG_SCORE	1.B.1	1.46e-07***		-6.44e-08		.000016		.005**	4.643**			YES	YES	43.096***	0.351
	1.B.2		4.377***					.006***	5.156***			YES	YES	40.214***	0.526
	1.B.3		4.389***		1.038**		-1.713**	-.005***	11.432***	-.179	-.218	YES	YES	40.214***	0.396
E_SCORE	1.C.1	.000281***		-.0007***		-1.01e-07		.006***	11.378***			YES	YES	38.69***	0.526
	1.C.2	.0002983***		-.0005688***		8.36e-06		0.000058	12.442***			YES	YES	41.286***	0.494
	1.C.3		5.751***		3.09***		-3.252***	008***	14.016	-.227	-.502**	YES	YES	.25	0.524
S_SCORE	1.D.1	.0001521***						.008***	13.974***			YES	YES	36.523***	0.526
	1.D.2	.00013***		.00032		.000031***		-.002	10.591***			YES	YES	36.77***	0.441
	1.D.3		1.516		.573		2.883**	.002	11,307***	.189	.125	YES	YES	-14.995	0.475
G_SCORE	1.E.1	.0000511		-.00069**		.000018**			9.799***			YES	YES	37.647***	0.233
	1.E.2	.0000882**		-.000974***		.000016**		-.003	9.778***			YES	YES	41.029***	0.239
	1.E.3		2.083***		-.372		-4.148***	.006**	9.014***	-.501**	-.429**	YES	YES	13.343*	0.324

Full models are found in Appendix25-28

Staggered Difference-in-Difference

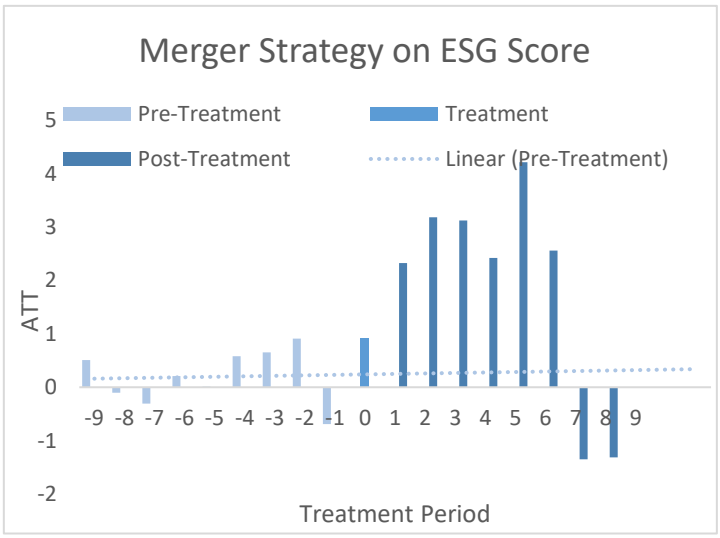
To substantiate and increase consensus regarding the initial conclusions from the Pooled OLS Models, a more advanced analysis is performed with Staggered Difference-in-Difference with dynamic treatment effects (Callaway & Sant'Anna, 2021). The first ten models (2.A.1-2.E.2), which test the first five hypotheses, use NOASSETS-283. Moreover, these models use *FIRST_MERGER* and *FIRST_DEMERGER* as the Treatment starting-time dummies. Hence, the first five models (2.A.1-2.E.1) use two stages to calculate the Average Treatment Effect of *MERGER_STR* on Treated of *ESG_INNOV, ESG_SCORE, E_SCORE, S_SCORE,* and *G_SCORE.* While the latter five models calculate the ATT of *DEMERGER_STR* (2.A.1-2.E.1). As an illustration, the first stage of MODEL 2.A.1 is found in Appendix 29.

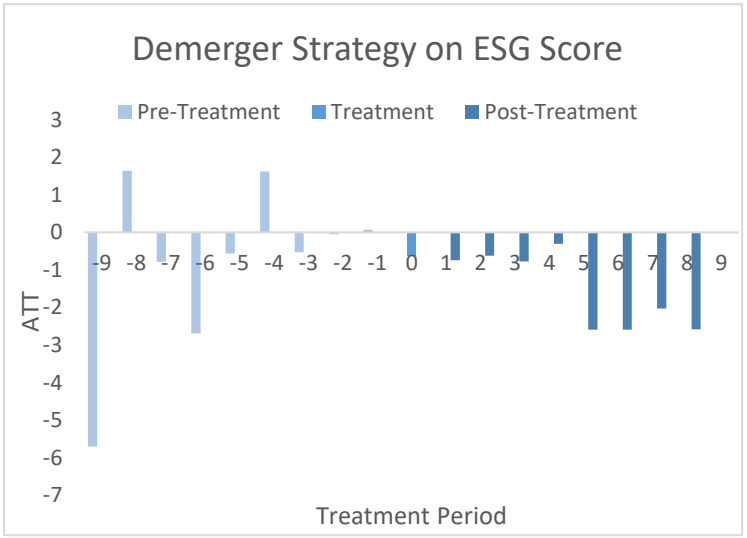
MODEL 2.A.1 (Appendix 30, Table A49) shows that a MERGER_STR positively affects a firm's sustainability innovation output (*ESG_INNOV*) in the preceding years of a merger. Furthermore, the impact is significant at a 10% significance level in the first three years. At the same time, MODEL 2.A.2 (Appendix 31, Table 54) shows that a *DEMERGER_STR* negatively affects *ESG_INNOV*. However, this effect is not significant at a 10% significance level. This result is in line with Feldman et al. (2021). So, showing proof not to reject H1. MODEL 2.B.1 (Table A50) also indicates that a *MERGER_STR* positively affects a firm's *ESG_SCORE* in the first three years following a merger transaction. The ESG_SORE 2.328, 3.186 and 3.125 points higher, significant at a 10% significance level, compared to a firm that does not have a Merger Strategy (Never-Treated). Whereas MODEL 2.B.2 (Table A55) reveals that a *DEMERGER_STR* has a non-significant negative effect in the post-transaction period. Thus, this result indicates that using a Merger Strategy (H2) can be very beneficial.

MODEL 2.C.1 (Table A51) points out that a *MERGER_STR* positively and significantly (10%) affects a firm's *E_SCORE* in the first year after a merger transaction (T_{+1}). Namely, these firms have, on average, a 2.267 point higher sub-score than firms with a divergent strategy. This confirms the results from (Barros et al., 2022). In comparison, MODEL 2.C.2 (Table A56) shows that the effects of *DEMERGER_STR* are adverse for *E_SCORE* but non-significant. The results seem to justify not rejecting H3. MODEL 2.D.1 (Table A52) uncovers that a *MERGER_STR* positively and significantly affects a firm's S_SCORE in the third year post-merger (4.0 points). MODEL 2.D.2 (Table A57) shows that the demerger's effect is negative and non-significant. So, H4 seems rejected. H5 also seems rejected, as MODEL 2.E.2 (Table A58) finds that the *G_SCORE* is on average 4.7 higher after two years.

Figure 3 displays the main result of the staggered DiD models regarding the research question below. Here, the coefficients of the varying periods can be analysed. However, it should be noted that only a few coefficients are actually significant in the model. (Appendix30). It is also observed that the pre-demergers period seems less stable and parallel compared to the pre-treatment period of mergers. This is reconfirmed as the null hypothesis that the pretreatment ATT is equal to zero is regrettably not rejected ($p<0.05$) for 2.B.2. Still, the parallel assumption of Callaway et al. (2021) holds for most other models. The remaining results, 2.A.1-2.E.1, are also visualised by figures (Appendix 37).

Figure 3 ATT Results of MODELS 2.B.1 and 2.B.2





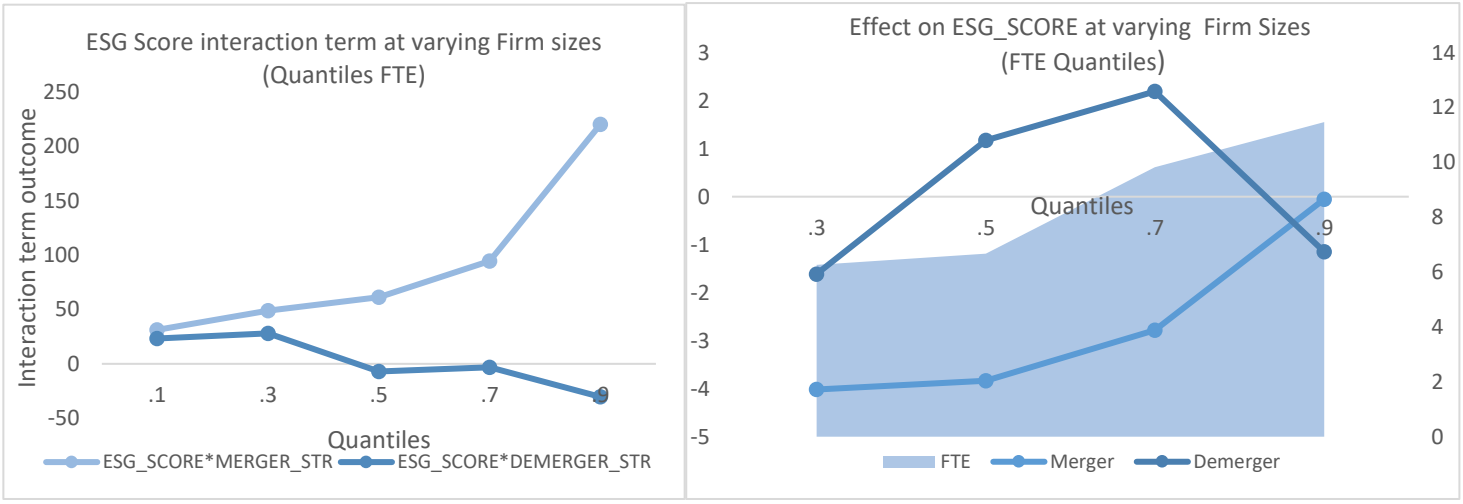
Furthermore, MODELS 2.A.3-2.A.E.4 (Appendix32-33) that utilise *MOST_MERGERS* and *MOST_DEMERGERS* were developed to account for the potential critical mass condition and the transaction learning effects (Collins et al., 2009). These results considerably deviate from the previous models. For instance, in general, there is a shorter period of significant positive effects in the post-treatment period for mergers. Hence, this indicates that a period with many and multiple transactions only has a minimum impact on a firm's performance. This follows the Multiple Acquirers Effect that Conn et al. (2004) observed. Moreover, the positive coefficients resulting from a year with many transactions are insignificant for *ESG_Score, S_Score* and *G_Score*. So, there is no evidence of a cumulative effect of many merger transactions, as found in the Pooled OLS Models (Table A28 -A47).

The results of MODELS 2.A.5-2.E.6 (Appendix34-36), with *RD*, *PROFIT* and *FTE* as controls, deviate significantly less from 2.A.1-2.E.1 overall, except for the findings of MODELS 2.D.6.

Quantile Regressions

The results from the quantile regression models are dedicated to testing H6. As discussed before, next to a formal quantile regression also, several non-formal quantile regressions were performed. Formal quantile regression can only be performed with varying quantiles of a dependent variable. Two variables, *MERGER_STR*ESG_SCORE* and *DEMERGER_STR*ESG_SCORE*, were thus created for this formal regression with FTE as the dependent variable, MODELS 3.B.1 (Appendix38). The results are also displayed in Figure 4a. The summary statistics of each quantile are found in Appendix41. It can only be said that larger firms are associated with a higher ESG Score when using a Merger- compared to a Demerger Strategy, a stronger conclusion cannot be drawn due to reverse causality.

Figure 4 Results of MODELS 3.B.1 (4a) and 3.B.2 (4b)



The non-formal quantile regressions, MODEL 3.B.2 and 3.B.3 (Appendix39), use the Stata command "xtile" to use *FTE* as an independent variable and divide it into quantiles that proxy varying firm sizes (Appendix41). The results (Figure 4b) clearly show an inflection point at a median of 113830 FTE employees (q.75). However, only the results of a Merger Strategy were significant (q.5 - q.9). Thus, H6 is rejected. The results of the robustness check with *ASSETS* as the firm size proxy, MODEL 3.B.4, draw a similar picture (Appendix40). Besides, it is seen that firm size becomes increasingly important in determining ESG Score as firm size increases. Three factors can explain this occurrence. Firstly, larger firms have the opportunity to benefit from economies of scale. Secondly, larger firms, as these firms are often more publicly visible and thus under heightened scrutiny to become more sustainable, as discussed in the Introduction. Lastly, larger firms often have more resources to gather and report the needed ESG data (Barros et al., 2022).

5. Conclusion

Firms face many pressures to become more sustainable, both external and internal. Therefore, this Master Thesis tried to determine whether a Merger Strategy or Demerger Strategy through innovation has a comparatively better effect on firm sustainability, proxied by ESG Score. Using Pooled OLS, Staggered DiD and Quantile Regressions, three datasets with up to 302 EU-listed firms were analysed from 2010 to 2019. All to ascertain whether a Corporate Restructuring Strategy improves a firm's ESG Score via innovation.

This observation period firstly allows for multiple macroeconomic cycles to be included, improving external validity (Roh et al.,2021). Also, higher explanatory power as Mergers, Demergers, and ESG innovation mechanisms become more observable (Hvidkjær, 2017). The scope of the research was Europe, where compared to the US, Merger and Demerger's strategy is still significantly understudied (Mateev, 2017). Besides, Mergers and Demergers are often seen as a vital route for innovation and ESG in the EU (Hood, 2022).

Comparing the effects of *BOTH_STR* and *NEITHER_STR,* it can already, to some extent, be seen that having a Corporate Restructuring Strategy can improve a firm's ESG Score. This is strengthened when evaluating the six tested hypotheses. The results of H1-5 are in Table 5. Appendix42 has a more elaborated account. The results of the methods occasionally contradict each other. However, in this thesis, more weight is laid on the staggered DiD as this more advanced empirical method does not suffer from potential endogeneity and also purely measures the treatment effects of a Merger and a Demerger.

Firstly, the first hypothesis is not rejected and thus is concluded that, on average, a Merger Strategy is more effective in increasing a firm’s sustainability innovation. This result follows the resource-based view of the firm that firms need to accumulate many resources to innovate and that a merger can help to adhere to this aim. The resource need outweighs the firm focus argument that Verma & Sharma (2019) argue. So, firms should more often consider obtaining ESG innovation (inputs) through mergers. The second hypothesis is not rejected. A corporate restructuring strategy can benefit firms seeking higher sustainability, as measured by ESG Score. Specifically, a merger strategy improves the ESG Score more than a demerger strategy. In other words, the embedding and adding effects on sustainability performance outstrip the losing effects post-transaction (Vastola &

Russo, 2020). Like Barros et al. (2022), mergers positively impact ESG scores. However, in the thesis, this has a more sizeable effect than an implemented demerger strategy has.

Moreover, hypothesis 3 is also not rejected. In line with Zheng et al. (2021), a merger strategy is more effective than a demerger strategy in increasing the environmental component of a firm's ESG score. Polluting firms like Shell and Exxon (Hiller et al., 2021) may relieve their environmental issues with a merger strategy that prospers highly needed sustainability innovation (K. H. Lee & Min, 2015). While at the same time weeding out greenwashed environmental sustainability (Duchin et al. (2022). And firms like Ford should maybe reconsider their demerger plans (Mullaney, 2022) when seeing this result. Hypothesis 4 is rejected. Firms seeking to increase social sustainability should consider a demerger strategy, as it requires focus, which can be achieved if it is smaller (Kang, 2012).

For more internal and organizational sustainability, a Merger Strategy seems more effective than a Demerger Strategy. Even though hypothesis 5 is rejected, this result is on par with the effect of corporate governance on sustainability found by Zheng et al. (2021). Lastly, hypothesis 6 is rejected. An inflexion point is observed between a merger strategy and a demerger strategy when firm size increases. But, this occurs at an opposite directional slope than expected. This result is quite counterintuitive and must be further studied. Still, it was seen that the importance of firm size in ESG Sores rises with firm size.

In sum, this master thesis concludes that a corporate restructuring strategy can improve a firm's ESG Score. This reconfirms the conclusion of Tampakoudis and Anagnostopoulou (2020). However, a generalized optimal efficacy choice between Merger vs Demerges still remains a bit ambiguous. Thus, a firm's strategy choice should be analysed on a per case basis by reviewing several firm criteria, which should undoubtedly include the firm size. Ultimately, a firm should be able to maximize its sustainability-oriented profit as a result of its strategic choice. Otherwise, rationally, EU firms will not engage in these strategies.

Table 5 Summary overview of the thesis results H1-5

Hypothesis	Measure	Pooled OLS	DiD	Conclusion
H1	ESG_INNOV	Rejected	Not Rejected	Merger Strategy is more effective
H2	ESG_SCORE	Rejected	Not Rejected	Merger Strategy is more effective
H3	E_SCORE	Rejected	Not Rejected	Merger Strategy is more effective
H4	S_SCORE	Not Rejected	Not Rejected	Demerger Strategy is more effective
H5	G_SCORE	Rejected	Rejected	Merger Strategy is more effective

6. Limitations & Future Research

Even though solid and novel research has been conducted with the thesis when scrutinised, it still has some limitations. The first primary concern is that the main results of the two methods used to test hypotheses 1-5 often contradict each other. Even though used in similar research (Barros et al., 2022), a Pooled OLS remains a somewhat limited empirical method. It ultimately remains unobserved and endogenous why firms exactly partake in a merger or demerger. So, in the thesis, more attention is put on the staggered DiD. Future research should try including the scarce available *DEAL_PURPOSE.*

Moreover, R. Yang and Jiménez-Martin, (2022) show that a proper ESG measurement and dataset play a much bigger role than the technique when calculating ESG Risk Scores: a solid economic foundation is key. Conservatively a similar conclusion may be drawn in this thesis's context, as the same assumptions hold. Furthermore, Ajmal et al. (2017) find that firms engaged in improving their sustainability are less vulnerable to risk. ESG Risk Scores provide firms with a clear framework to better understand their ESG performance (Marsh, 2022). Whereas an ESG Score determines the firm's sustainability performance retrospectively, ESG Risk Scores assess a firm's performance on ESG issues and exposure to ESG-related risks prospectively (EBA, 2020). Running a similar analysis with this other sustainability proxy could be interesting to test the robustness of the obtained results. But ESG Risk data could not be collected as the monthly download limit was already reached at EDSC's Bloomberg Terminals during the data gathering phase of the thesis.

As this thesis highlights its innovation perspective, it is paramount that its innovation measure is adequate and robust. Thus, R&D was used to substantiate this perspective. Yet, Acs and Audretsch (2005) see it as a limited proxy as R&D only reflects the resources devoted to producing innovative output, but not the amount of innovative activity actually realized. Moreover, data granularity was a bottleneck: *DEAL_VALUE* ($) was unavailable, and *MERGER_TYPES* (horizontal, vertical and conglomerate) were not distinguished in the thesis. Gugler et al. (2003) see that post-merger performance significantly differs across these types. Furthermore, as stated in the Conclusion, the result of H6 should be further researched. Lastly, Tampakoudis et al. (2021) replicated their own study within the scope of the COVID-19 pandemic. They drew a different conclusion, as they now find a strong negative value effect of M&A on ESG performance post-merger. Hence, it could be interesting also to replicate this thesis research design within that same COVID-19 scope.

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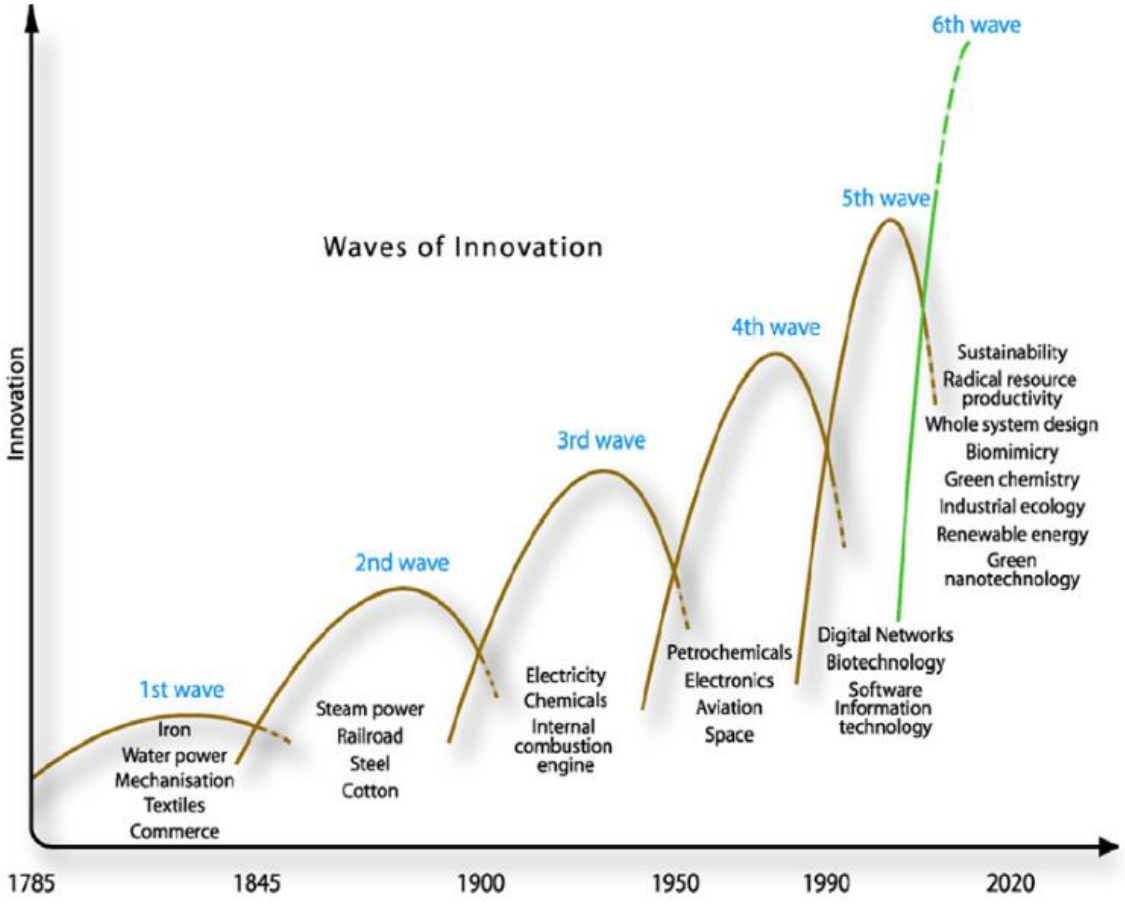
8. Appendix

Appendix1

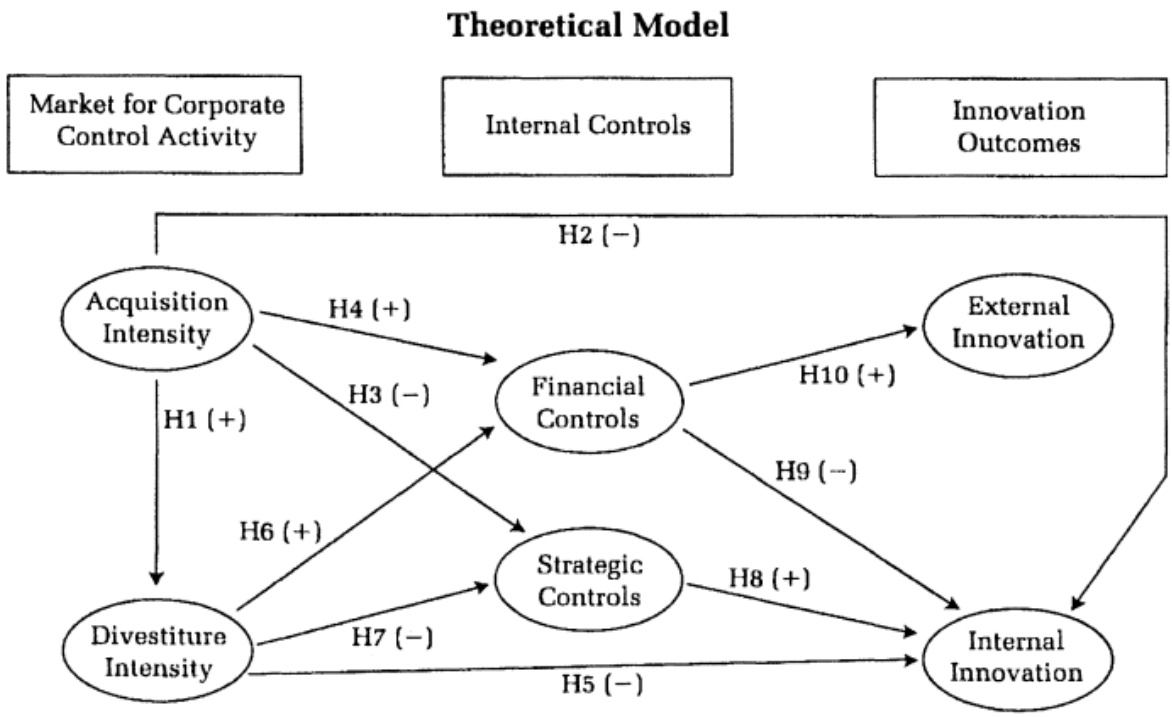
Figure A1 sustainability as a 6th 'long wave'



Source: Seebode et al. (2012)

Appendix2

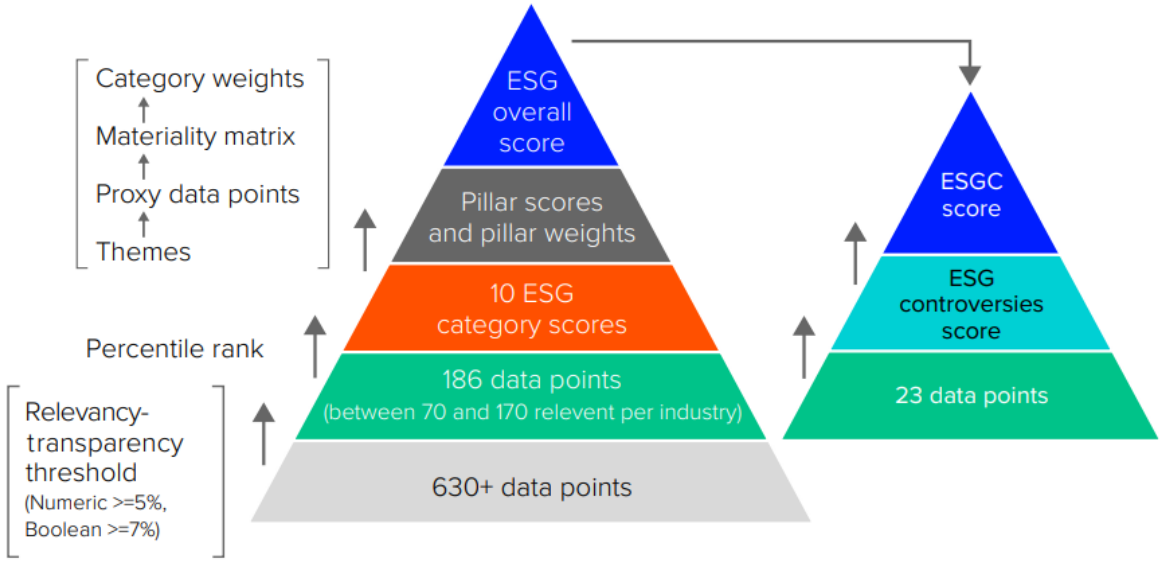
Figure A2 theoretical model Ruigrok et al. (1999)



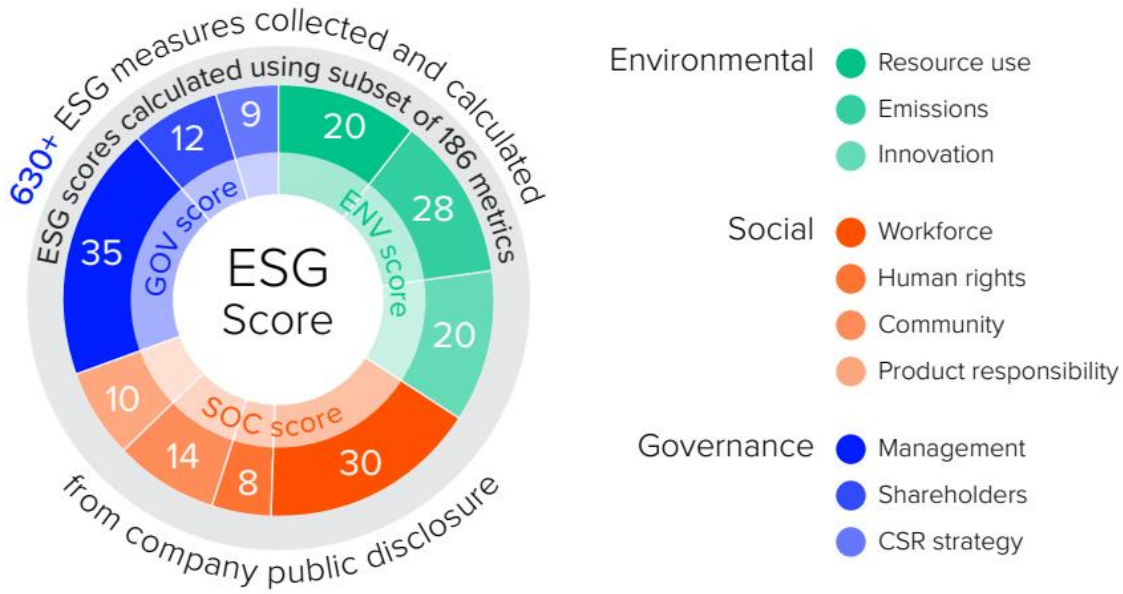
Source: Ruigrok et al. (1999)

Appendix3

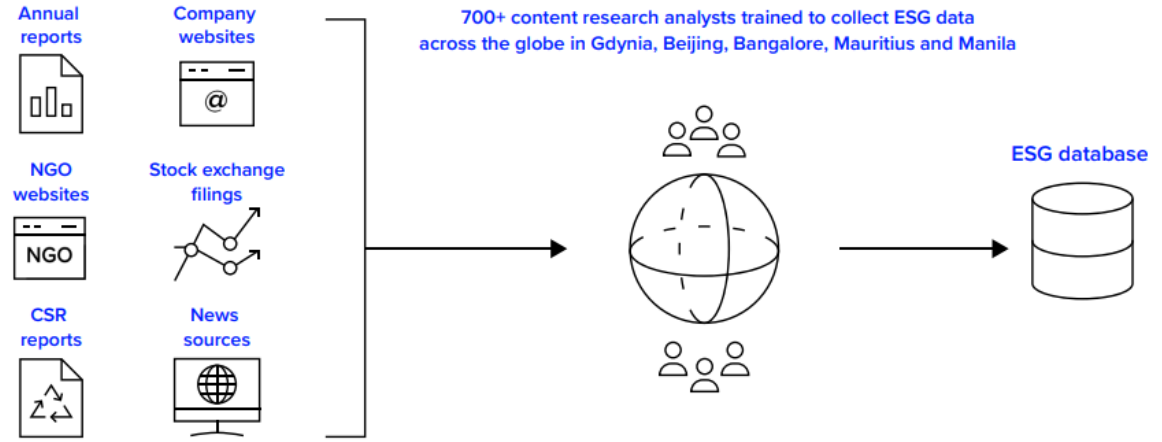
Figure A3 methodology Refinitiv ESG Score



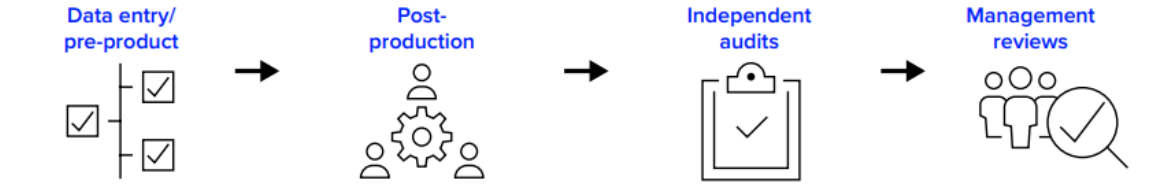
Source: Refinitiv



Source: Refinitiv



Data quality is a key part of the collection process; that is why we use a combination of both algorithmic and human processes to make sure we achieve as close to 100% data quality as possible. Below is an overview of the various methods we use to achieve this goal.



- Around 400 built-in error check logics in the collection tool for various data points
- Error checks can be tailor-made for specific requirements

Around 300 automated quality check screeners run on the ESG collection tool:

- Relating to interrelated data points
- Negative screening
- Inconsistency, or missing quantitative and qualitative data
- Scaling
- Variance within a year
- Raw data and comments section
- Sector-based checks (TRBC codes)
- Validating completeness of the prior year

Sample audits on a daily basis:

- Detailed audits
- Critical data point checks
- Product audits

Weekly reporting and root cause analysis:

- Feedback sessions with the production teams

- Monthly quality deep dives
- Heatmap analysis with top areas for concern
- Measures to address problematic topics and data points
- New system validation checks and screeners are constantly created based on new learning, insights and feedback to continuously improve the data quality

Source: Refinitiv

Appendix4

(1.A.2)

$$\text{ESG\_INNOV}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables_{2it} + \beta_3 TimeInVariant\ Control\ Variables_{3i} + \beta_4 TimeVariant\ Control\ Variables_{4it} + u_{it}$$

(1.B.2)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables_{2it} + \beta_3 TimeInVariant\ Control\ Variables_{3i} + \beta_4 TimeVariant\ Control\ Variables_{4it} + u_{it}$$

(1.C.2)

$$\text{E\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables_{2it} + \beta_3 TimeInVariant\ Control\ Variables_{3i} + \beta_4 TimeVariant\ Control\ Variables_{4it} + u_{it}$$

(1.D.2)

$$\text{S\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables_{2it} + \beta_3 TimeInVariant\ Control\ Variables_{3i} + \beta_4 TimeVariant\ Control\ Variables_{4it} + u_{it}$$

(1.E.2)

$$\text{G\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables_{2it} + \beta_3 TimeInVariant\ Control\ Variables_{3i} + \beta_4 TimeVariant\ Control\ Variables_{4it} + u_{it}$$

Appendix5

(1.A.3)

$$\text{ESG\_INNOV}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + u_{it}$$

(1.B.3)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + u_{it}$$

(1.C.3)

$$\text{E\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + u_{it}$$

(1.D.3)

$$\text{S\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + u_{it}$$

(1.E.3)

$$\text{G\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + u_{it}$$

Appendix6

(1.A.4)

$$\text{ESG\_INNOV}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + \beta_8 FTE * 3lagNR\_MERGERS_{8it} + \beta_9 FTE * NR\_DEMERGERS_{9it} + u_{it}$$

(1.B.4)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + \beta_8 FTE * 3lagNR\_MERGERS_{8it} + \beta_9 FTE * NR\_DEMERGERS_{9it} + u_{it}$$

(1.C.4)

$$\text{E\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + \beta_8 FTE * 3lagNR\_MERGERS_{8it} + \beta_9 FTE * NR\_DEMERGERS_{9it} + u_{it}$$

(1.D.4)

$$\text{S\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + \beta_8 FTE * 3lagNR\_MERGERS_{8it} + \beta_9 FTE * NR\_DEMERGERS_{9it} + u_{it}$$

(1.E.4)

$$\text{G\_SCORE}_{it} = \beta_0 + \beta_1 RD_{1it} + \beta_2 Independent\ Variables\ (\text{including prefix 3lag})_{2it} + \beta_3 RD * 3lag\ NR\_MERGERS_{3it} + \beta_4 RD * NR\_DEMERGERS_{4it} + \beta_5 TimeVariant\ Control\ Variables_{5it} + \beta_6 TimeVariant\ Control\ Variables_{6it} + \beta_7 TimeVariant\ Control\ Variables(\log transformed)_{7it} + \beta_8 FTE * 3lagNR\_MERGERS_{8it} + \beta_9 FTE * NR\_DEMERGERS_{9it} + u_{it}$$

Appendix7

(2.A.1)

$$ATT(g,t,d|g,d) = E[\text{ESG\_INNOV}_t(g,d) - \text{ESG\_INNOV}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.B.1)

$$ATT(g,t,d|g,d) = E[\text{ESG\_SCORE}_t(g,d) - \text{ESG\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.C.1)

$$ATT(g,t,d|g,d) = E[\text{E\_SCORE}_t(g,d) - \text{E\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.D.1)

$$ATT(g,t,d|g,d) = E[\text{S\_SCORE}_t(g,d) - \text{S\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.E.1)

$$ATT(g,t,d|g,d) = E[\text{G\_SCORE}_t(g,d) - \text{G\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

Appendix8

(2.A.2)

$$ATT(g,t,d|g,d) = E[\text{ESG\_INNOV}_t(g,d) - \text{ESG\_INNOV}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.B.2)

$$ATT(g,t,d|g,d) = E[\text{ESG\_SCORE}_t(g,d) - \text{ESG\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.C.2)

$$ATT(g,t,d|g,d) = E[\text{E\_SCORE}_t(g,d) - \text{E\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.D.2)

$$ATT(g,t,d|g,d) = E[\text{S\_SCORE}_t(g,d) - \text{S\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

(2.E.2)

$$ATT(g,t,d|g,d) = E[\text{G\_SCORE}_t(g,d) - \text{G\_SCORE}_t(0)|G = g, \text{FIRST\_MERGER} = d] \; for \; t \geq g - \delta.$$

Appendix9

(2.A.3)

$$ATT(g,t,d|g,d) = E[\text{ESG\_INNOV}_t(g,d) - \text{ESG\_INNOV}_t(0)|G = g, \text{MOST\_MERGERS} = d] \; for \; t \geq g - \delta.$$

(2.B.3)

$$ATT(g,t,d|g,d) = E[\text{ESG\_SCORE}_t(g,d) - \text{ESG\_SCORE}_t(0)|G = g, \text{MOST\_MERGERS} = d] \; for \; t \geq g - \delta.$$

(2.C.3)

$$ATT(g,t,d|g,d) = E[\text{E\_SCORE}_t(g,d) - \text{E\_SCORE}_t(0)|G = g, \text{MOST\_MERGERS} = d] \; for \; t \geq g - \delta.$$

(2.D.3)

$$ATT(g,t,d|g,d) = E[\text{S\_SCORE}_t(g,d) - \text{S\_SCORE}_t(0)|G = g, \text{MOST\_MERGERS} = d] \; for \; t \geq g - \delta.$$

(2.E.3)

$$ATT(g,t,d|g,d) = E[\text{G\_SCORE}_t(g,d) - \text{G\_SCORE}_t(0)|G = g, \text{MOST\_MERGERS} = d] \; for \; t \geq g - \delta.$$

Appendix10

(2.A.4)

$$ATT(g,t,d|g,d) = E[\text{ESG\_INNOV}_t(g,d) - \text{ESG\_INNOV}_t(0)|G = g, \text{MOST\_DEMERGERS} = d] \; for \; t \geq g - \delta.$$

(2.B.4)

$$ATT(g,t,d|g,d) = E[\text{ESG\_SCORE}_t(g,d) - \text{ESG\_SCORE}_t(0)|G = g, \text{MOST\_DEMERGERS} = d] \; for \; t \geq g - \delta.$$

(2.C.4)

$$ATT(g,t,d|g,d) = E[\text{E\_SCORE}_t(g,d) - \text{E\_SCORE}_t(0)|G = g, \text{MOST\_DEMERGERS} = d] \; for \; t \geq g - \delta.$$

(2.D.4)

$$ATT(g,t,d|g,d) = E[\text{S\_SCORE}_t(g,d) - \text{S\_SCORE}_t(0)|G = g, \text{MOST\_DEMERGERS} = d] \; for \; t \geq g - \delta.$$

(2.E.4)

$$ATT(g,t,d|g,d) = E[\text{G\_SCORE}_t(g,d) - \text{G\_SCORE}_t(0)|G = g, \text{MOST\_DEMERGERS} = d] \; for \; t \geq g - \delta.$$

Appendix11

(2.A.5)

$$ATT(g,t,d|g,d) = E\left[(\text{ESG\_INNOV}_t(g,d) + RD(g,d) + PROFIT(g,d) + FTE(g,d)) - (\text{ESG\_INNOV}_t(0) + RD(0) + PROFIT(0) + FTE(0))|G = g, \text{FIRST\_MERGER} = d\right]$$
$$for\ t \geq g$$

(2.B.5)

$$ATT(g,t,d|g,d) = E\left[(\text{ESG\_SCORE}_t(g,d) + RD(g,d) + PROFIT(g,d) + FTE(g,d)) - (\text{ESG\_SCORE}_t(0) + RD(0) + PROFIT(0) + FTE(0))|G = g, \text{FIRST\_MERGER} = d\right]$$
$$for\ t \geq g$$

(2.C.5)

$$ATT(g,t,d|g,d) = E\left[(\text{E\_SCORE}_t(g,d) + RD(g,d) + PROFIT(g,d) + FTE(g,d)) - (\text{E\_SCORE}_t(0) + RD(0) + PROFIT(0) + FTE(0))|G = g, \text{FIRST\_MERGER} = d\right]$$
$$for\ t \geq g$$

(2.D.5)

$$ATT(g,t,d|g,d) = E\left[(\text{S\_SCORE}_t(g,d) + RD(g,d) + PROFIT(g,d) + FTE(g,d)) - (\text{S\_SCORE}_t(0) + RD(0) + PROFIT(0) + FTE(0))|G = g, \text{FIRST\_MERGER} = d\right]$$
$$for\ t \geq g$$

(2.E.5)

$$ATT(g,t,d|g,d) = E\left[(\text{G\_SCORE}_t(g,d) + RD(g,d) + PROFIT(g,d) + FTE(g,d)) - (\text{G\_SCORE}_t(0) + RD(0) + PROFIT(0) + FTE(0))|G = g, \text{FIRST\_MERGER} = d\right]$$
$$for\ t \geq g$$

Appendix12

(2.A.6)

$$ATT(g,t,d|g,d) = E\left[(\text{ESG\_INNOV}_t\ (g,d) + RD(g,d) + PROFIT(g,d) + FTE\ (g,d)) - (\text{ESG\_INNOV}_t\ (0) + RD(0) + PROFIT(0) + FTE\ (0))|G = g, \text{FIRST\_DEMERGER} = d\right]$$
$$for\ t \geq g$$

(2.B.6)

$$ATT(g,t,d|g,d) = E\left[(\text{ESG\_SCORE}_t\ (g,d) + RD(g,d) + PROFIT(g,d) + FTE\ (g,d)) - (\text{ESG\_SCORE}_t\ (0) + RD(0) + PROFIT(0) + FTE\ (0))|G = g, \text{FIRST\_DEMERGER} = d\right]$$
$$for\ t \geq g$$

(2.C.6)

$$ATT(g,t,d|g,d) = E\left[(\text{E\_SCORE}_t\ (g,d) + RD(g,d) + PROFIT(g,d) + FTE\ (g,d)) - (\text{E\_SCORE}_t\ (0) + RD(0) + PROFIT(0) + FTE\ (0))|G = g, \text{FIRST\_DEMERGER} = d\right]$$
$$for\ t \geq g$$

(2.D.6)

$$ATT(g,t,d|g,d) = E\left[(\text{S\_SCORE}_t\ (g,d) + RD(g,d) + PROFIT(g,d) + FTE\ (g,d)) - (\text{S\_SCORE}_t\ (0) + RD(0) + PROFIT(0) + FTE\ (0))|G = g, \text{FIRST\_DEMERGER} = d\right]$$
$$for\ t \geq g$$

(2.E.6)

$$ATT(g,t,d|g,d) = E\left[(\text{G\_SCORE}_t\ (g,d) + RD(g,d) + PROFIT(g,d) + FTE\ (g,d)) - (\text{G\_SCORE}_t\ (0) + RD(0) + PROFIT(0) + FTE\ (0))|G = g, \text{FIRST\_DEMERGER} = d\right]$$
$$for\ t \geq g$$

Appendix13

(3.B.1)

$$FTE_{it} = \beta_0 + \beta_1 MERGER\_STR * ESG\_SCORE_{1it} + \beta_2 DEMERGER\_STR * ESG\_SCORE_{2it} + \beta_3 RD_{3it} + \beta_4 PROFIT_{4it} + \beta_{5it} REVENUE_{5it} + CAPEX_{6it} + \beta_{7it} FIRM\_AGE_{7it} + \beta_{8it} ESG\_STR_{8it} + u_{it}$$

Appendix14

(3.B.2)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 MERGER\_STR_{1it} + \beta_2 DEMERGER\_STR_{2it} + \beta_3 RD_{3it} + \beta_4 PROFIT_{4it} + \beta_{5it} REVENUE_{5it} + +\beta_{6it} CAPEX_{6it} + \beta_{7it} FIRM\_AGE_{7it} + \beta_{8it} ESG\_STR_{8it} + \beta_{9it} COUNTRY\_D_{9it} + \beta_{10it} SECTOR\_D_{10it} + FTE\_2_{11it} \dots \beta_{12} FTE\_5_{12} + u_{it}$$

Appendix15

(3.B.3)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 MERGER\_STR_{1it} + \beta_2 DEMERGER\_STR_{2it} + \beta_3 logRD_{3it} + \beta_4 logPROFIT_{4it} + \beta_{5it} logREVENUE_{5it} + \beta_{6it} logCAPEX_{6it} + \beta_{7it} FIRM\_AGE_{7it} + \beta_{8it} ESG\_STR_{8it} + \beta_{9it} COUNTRY\_D_{9it} + \beta_{10it} SECTOR\_D_{10it} + FTE\_2_{11it} \dots \beta_{12} FTE\_5_{12} + u_{it}$$

Appendix16

(3.B.4)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 MERGER\_STR_{1it} + \beta_2 DEMERGER\_STR_{2it} + \beta_3 RD_{3it} + \beta_4 PROFIT_{4it} + \beta_{5it} REVENUE_{5it} + \beta_{5it} REVENUE_{5it} + \beta_{6it} CAPEX_{6it} + \beta_{7it} FIRM\_AGE_{7it} + \beta_{8it} ESG\_STR_{8it} + \beta_{9it} COUNTRY\_D_{9it} + \beta_{10it} SECTOR\_D_{10it} + FTE\_2_{11it} \dots \beta_{12} FTE\_5_{12} + u_{it}$$

Appendix17

(3.B.5)

$$\text{ESG\_SCORE}_{it} = \beta_0 + \beta_1 MERGER\_STR_{1it} + \beta_2 DEMERGER\_STR_{2it} + \beta_3 logRD_{3it} + \beta_4 logPROFIT_{4it} + \beta_{5it} logREVENUE_{5it} + \beta_{6it} logCAPEX_{6it} + \beta_{7it} FIRM\_AGE_{7it} + \beta_{8it} ESG\_STR_{8it} + \beta_{9it} COUNTRY\_D_{9it} + \beta_{10it} SECTOR\_D_{10it} + ASSETS\_2_{11it} \dots \beta_{12} ASSETS\_5_{12} + u_{it}$$

Appendix18

Table A1 Descriptive Statistics of FULL_NoR&D-302

Variable		Mean	Std. dev.	Min	Max	Observations
COUNTRY_D	Overall	9.721.854	5.011.625	1	18	N = 3020
	Between		5.019.112	1	18	n = 302
	within		0	9.721.854	9.721.854	T = 10
SECTOR_D	overall	1.810.596	1.069.382	1	38	N = 3020
	between		1.070.979	1	38	n = 302
	within		0	1.810.596	1.810.596	T = 10
MERGER_STR	overall	.4082781	.4915965	0	1	N = 3020
	between		.3622984	0	1	n = 302
	within		.3328638	-.4917219	1.308.278	T = 10
S_MERGER_STR	overall	.1347682	.3415324	0	1	N = 3020
	between		.170644	0	.9	n = 302
	within		.2959929	-.7652318	1.034.768	T = 10
DEMERGER_STR	overall	.3615894	.4805403	0	1	N = 3020
	between		.3456153	0	1	n = 302
	within		.3344026	-.5384106	1.261.589	T = 10
DEMERGER_STR	overall	.0880795	.2834574	0	1	N = 3020
	between		.1214131	0	.6	n = 302
	within		.2562243	-.5119205	.9880795	T = 10
BOTH_STR	overall	.2735099	.4458341	0	1	N = 3020
	between		.3177374	0	1	n = 302
	within		.3132283	-.6264901	117.351	T = 10
NEITHER_STR	overall	.5036424	.5000695	0	1	N = 3020
	between		.391462	0	1	n = 302
	within		.3119036	-.3963576	1.403.642	T = 10
ESG_SCORE	overall	61.94135	16.72344	42.56.667	93.44333	N = 3020
	between		147.191	12.644	9.042.967	n = 302
	within		7.979.192	2.717.335	1.027.504	T = 10
E_SCORE	overall	64.90085	2.184.865	.77	98.89	N = 3020
	between		2.002.721	5.742	96.742	n = 302
	within		8.801.723	1.988.285	1.268.628	T = 10
S_SCORE	overall	66.44957	2.042.229	1.16	98.63	N = 3020
	between		1.751.954	4.823	95.115	n = 302
	within		1.053.805	2.507.957	1.111.916	T = 10
G_SCORE	overall	55.00092	2.157.231	4.5	97.73	N = 3020
	between		1.849.014	11.857	91.127	n = 302
	within		1.115.788	1.021.292	1.017.939	T = 10
NR_MERGERS	overall	1.384.437	2.774.074	0	36	N = 3020
	between		2.158.255	0	13.5	n = 302
	within		1.746.799	-8.215.563	2.778.444	T = 10

CUM_MERGERS	overall	1.384.437	2.774.074	0	36	N = 3020
	between		2.158.255	0	13.5	n = 302
	within		1.746.799	-8.215.563	2.778.444	T = 10
NR_DEMERGERS	overall	1.123.179	2.266.902	0	21	N = 3020
	between		1.867.183	0	11.4	n = 302
	within		1.289.523	-8.276.821	1.072.318	T = 10
CUM_DEMERGERS	overall	6.411.258	1.242.697	0	123	N = 3020
	between		10.667	0	76.8	n = 302
	within		6.401.867	-4.938.874	6.721.126	T = 10
PROFIT	overall	1298273	2320933	-1.12e+07	2.35e+07	N = 3020
	between		2124880	-440700	1.54e+07	n = 302
	within		940783.2	-1.02e+07	9604173	T = 10
REVENUE	overall	1.47e+07	2.25e+07	47050	1.82e+08	N = 3020
	between		2.20e+07	151194.1	1.51e+08	n = 302
	within		4862971	-4.07e+07	6.34e+07	T = 10
CAPEX	overall	881803.5	1951628	-416000	2.36e+07	N = 3020
	between		1882109	3633.2	1.71e+07	n = 302
	within		526380	-4364718	7760204	T = 10
FTE	overall	46628.75	68713.67	34	611020	N = 3020
	between		65489.39	60.8	415503.2	n = 302
	within		21106.71	-170568.3	412421.8	T = 10
FIRM_AGE	overall	51.84982	46.04603	0	330	N = 3020
	between		45.89652	4.5	325.5	n = 302
	within		4.521951	-21.65018	102.3498	T = 10
ESG_INNOV	overall	48.13.746	33.01.564	0	99.68	N = 3020
	between		2.973.512	0	98.958	n = 302
	within		1.443.923	-2.911.954	1.329.085	T = 10
ESG_STRA	overall	.8201987	.3840855	0	1	N = 3020
	between		.3122461	0	1	n = 302
	within		.2243093	-.0798013	1.720.199	T = 10

Table A2 Descriptive Statistics of FULL_NOASSETS-283

Variable	Column1	Mean	Std. dev.	Min	Max	Observations
COUNTRY_D	overall	9.671.378	5.002.099	1	18	N = 2830
	between		5.010.074	1	18	n = 283
	within		0	9.671.378	9.671.378	T = 10
SECTOR_D	overall	1.846.996	1.062.728	1	38	N = 2830
	between		1.064.423	1	38	n = 283
	within		0	1.846.996	1.846.996	T = 10
MERGER_STR	overall	.4010601	.4901998	0	1	N = 2830
	between		.3606027	0	1	n = 283
	within		.3326787	-.4989399	130.106	T = 10
S_MERGER_STR	overall	.1371025	.3440163	0	1	N = 2830
	between		.1721827	0	.9	n = 283
	within		.2979843	-.7628975	1.037.102	T = 10
DEMERGER_STR	overall	.3533569	.4780968	0	1	N = 2830
	between		.342624	0	1	n = 283
	within		.3340043	-.5466431	1.253.357	T = 10
DEMERGER_STR	overall	.0893993	.2853696	0	1	N = 2830
	between		.1238879	0	.6	n = 283
	within		.2571701	-.5106007	.9893993	T = 10
BOTH_STR	overall	.2639576	.4408545	0	1	N = 2830
	between		.3114389	0	1	n = 283
	within		.3125172	-.6360424	1.163.958	T = 10
NEITHER_STR	overall	.5095406	.4999973	0	1	N = 2830
	between		.3925017	0	1	n = 283
	within		.3105315	-.3904594	1.409.541	T = 10
ESG_SCORE	overall	61.97337	16.38958	42.56667	93.36333	N = 2830
	between		14.35.872	12.644	90.42.967	n = 283
	within		7.943641	2.720.537	9.774.037	T = 10
E_SCORE	overall	65.34422	2.108.966	.84	98.89	N = 2830
	between		1.930.555	5.742	96.742	n = 283
	within		8.558.919	2.032.622	1.273.062	T = 10
S_SCORE	overall	66.72777	20.457	1.16	98.63	N = 2830
	between		1.752.569	4.823	95.115	n = 283
	within		1.059.794	2.535.777	1.114.698	T = 10
G_SCORE	overall	544.197	2.140.161	4.5	97.73	N = 2830
	between		1.826.564	11.857	91.127	n = 283
	within		1.120.075	9.631.703	1.012.127	T = 10
NR_MERGERS	overall	1.326.855	2.681.296	0	36	N = 2830
	between		2.069.515	0	13.2	n = 283
	within		1.708.824	-8.273.145	2.772.686	T = 10
CUM_MERGERS	overall	1.326.855	2.681.296	0	36	N = 2830

	between		2.069.515	0	13.2	n = 283
	within		1.708.824	-8.273.145	2.772.686	T = 10
NR_DEMERGERS	overall	1.037.456	2.103.207	0	21	N = 2830
	between		1.716.217	0	11.4	n = 283
	within		1.219.611	-8.362.544	1.063.746	T = 10
CUM_DEMERGERS	overall	5.943.463	1.119.958	0	114	N = 2830
	between		9.552.308	0	56.5	n = 283
	within		5.871.476	-4.265.654	6.674.346	T = 10
R&D	overall	5.43e+08	2.54e+09	-2.29e+07	4.17e+10	N = 2829
	between		2.52e+09	0	3.52e+10	n = 283
	within		3.49e+08	-3.21e+09	7.04e+09	T = 9.99647
PROFIT	overall	1231293	2293650	-1.12e+07	2.35e+07	N = 2830
	between		2092682	-440700	1.54e+07	n = 283
	within		946280.9	-1.03e+07	9537193	T = 10
REVENUE	overall	1.40e+07	2.14e+07	47050	1.82e+08	N = 2830
	between		2.09e+07	151194.1	1.51e+08	n = 283
	within		4716286	-4.14e+07	6.26e+07	T = 10
CAPEX	overall	907142.4	1993814	-416000	2.36e+07	N = 2830
	between		1925104	3633.2	1.71e+07	n = 283
	within		530149	-4339380	7785542	T = 10
FTE	overall	47227.28	69994.74	34	611020	N = 2830
	between		66640.66	60.8	415503.2	n = 283
	within		21735.11	-169969.7	413020.3	T = 10
FIRM_AGE	overall	72.16.784	2.062.672	0	330	N = 2830
	between		2.065.761	4.5	325.5	n = 283
	within		2.872.789	6.766.784	7.666.784	T = 10
ESG_INNOV	overall	4.798.208	327.126	0	99.68	N = 2830
	between		2.946.785	0	98.958	n = 283
	within		1.430.113	-2.927.492	1.219.051	T = 10
ESG_STRA	overall	.8144876	.3887814	0	1	N = 2830
	between		.3184103	0	1	n = 283
	within		.2238043	-.0855124	1.714.488	T = 10

Table A3 Descriptive Statistics of FULL-271

Variable		Mean	Std. dev.	Min	Max	Observations
COUNTRY_D	overall	8.760.148	4.843.589	1	17	N = 2710
	between		4.851.655	1	17	n = 271
	within		0	8.760.148	8.760.148	T = 10
SECTOR_D	overall	1.848.339	1.059.536	1	38	N = 2710
	between		10.613	1	38	n = 271
	within		0	1.848.339	1.848.339	T = 10
MERGER_STR	overall	.4095941	.4918496	0	1	N = 2710
	between		.3627827	0	1	n = 271
	within		.3327792	-.4904059	1.309.594	T = 10
S_MERGER_STR	overall	.1394834	.3465142	0	1	N = 2710
	between		.1743509	0	.9	n = 271
	within		.2996245	-.7605166	1.039.483	T = 10
DEMERGER_STR	overall	.3583026	.4795902	0	1	N = 2710
	between		.3449037	0	1	n = 271
	within		.3338313	-.5416974	1.258.303	T = 10
DEMERGER_STR	overall	.0881919	.2836261	0	1	N = 2710
	between		.1241596	0	.6	n = 271
	within		.2551066	-.5118081	.9881919	T = 10
BOTH_STR	overall	.2701107	.4440987	0	1	N = 2710
	between		.3149832	0	1	n = 271
	within		.3135903	-.6298893	1.170.111	T = 10
NEITHER_STR	overall	.502214	.5000874	0	1	N = 2710
	between		.3936471	0	1	n = 271
	within		.3092639	-.397786	1.402.214	T = 10
ESG_SCORE	overall	62.36395	16.28.491	42.56667	93.36333	N = 2710
	between		1.422.534	12.644	9.042.967	n = 271
	within		7.969.333	2.759.595	9.813.095	T = 10
E_SCORE	overall	65.92219	2.078.093	.84	98.89	N = 2710
	between		1.894.438	5.742	96.742	n = 271
	within		8.611.021	2.090.419	1.278.842	T = 10
S_SCORE	overall	67.10723	20.51.781	1.16	98.63	N = 2710
	between		1.756.743	4.823	95.115	n = 271
	within		1.064.853	2.573.723	1.118.492	T = 10
G_SCORE	overall	54.65782	214.044	4.5	97.73	N = 2710
	between		1.831.585	11.857	91.127	n = 271
	within		1.112.621	9.869.815	1.014.508	T = 10
NR_MERGERS	overall	1.370.849	2.726.238	0	36	N = 2710
	between		210.171	0	13.2	n = 271
	within		174.065	-8.229.151	2.777.085	T = 10

CUM_MERGERS	overall	1.370.849	2.726.238	0	36	N = 2710
	between		210.171	0	13.2	n = 271
	within		174.065	-8.229.151	2.777.085	T = 10
NR_DEMERGERS	overall	1.064.207	2.133.841	0	21	N = 2710
	between		1.744.051	0	11.4	n = 271
	within		1.233.559	-8.335.793	1.066.421	T = 10
CUM_DEMERGERS	overall	6.135.793	1.139.022	0	114	N = 2710
	between		9.705.287	0	56.5	n = 271
	within		5.988.114	-4.246.421	6.693.579	T = 10
RD	overall	5.66e+08	2.59e+09	-2.29e+07	4.17e+10	N = 2709
	between		2.57e+09	0	3.52e+10	n = 271
	within		3.56e+08	-3.19e+09	7.06e+09	T = 9.99631
PROFIT	overall	1267903	2331774	-1.12e+07	2.35e+07	N = 2710
	between		2126731	-440700	1.54e+07	n = 271
	within		963956	-1.02e+07	9573803	T = 10
REVENUE	overall	1.44e+07	2.17e+07	47050	1.82e+08	N = 2710
	between		2.12e+07	151194.1	1.51e+08	n = 271
	within		4817473	-4.11e+07	6.30e+07	T = 10
CAPEX	overall	942711.7	2030026	-416000	2.36e+07	N = 2710
	between		1959674	3633.2	1.71e+07	n = 271
	within		541705.9	-4303810	7821112	T = 10
FTE	overall	48539.17	71109.47	36	611020	N = 2710
	between		67696.13	113.1	415503.2	n = 271
	within		22113.7	-168657.8	414332.2	T = 10
ASSETS	overall	52560.41	186453.5	1.899.947	2164103	N = 2710
	between		184287.6	3.786.669	1675233	n = 271
	within		30262.93	-601568.1	541430.4	T = 10
FIRM_AGE	overall	65.04.44	1.740.149	0	330	N = 2710
	between		1.742.809	4.5	325.5	n = 271
	within		2.872.811	6.054.244	6.954.244	T = 10
ESG_INNOV	overall	4.860.879	3.275.942	0	99.68	N = 2710
	between		2.945.932	0	98.958	n = 271
	within		1.442.952	-2.864.821	1.225.318	T = 10
ESG_STRA	overall	.8199262	.3843198	0	1	N = 2710
	between		.3146568	0	1	n = 271
	within		.2214086	-.0800738	1.719.926	T = 10

Appendix 19

Table A4 Tabulation of ESG_STRA of FULL_NoR&D-302

ESG_STRA	Freq.	Percent	Cum.
0	543	17.98	17.98
1	2477	82.02	100.00
Total	3020	100.00	

Table A5 Tabulation of MERGER_STR of FULL_NoR&D-302

MERGER_STR	Freq.	Percent	Cum.
0	1787	59.17	30.13
1	1233	40.83	100.00
Total	3020	100.00	

Table A6 Tabulation of S_MERGER_STR of FULL_NoR&D-302

S_MERGER_STR	Freq.	Percent	Cum.
0	2613	86.52	86.52
1	407	13.48	100.00
Total	3020	100.00	

Table A7 Tabulation of DEMERGER_STR of FULL_NoR&D-302

DEMERGER_STR	Freq.	Percent	Cum.
0	1928	63.84	63.84
1	1092	36.16	100.00
Total	3020	100.00	

Table A8 Tabulation of S_DEMERGER_STR of FULL_NoR&D-302

S_DEMERGER_STR	Freq.	Percent	Cum.
0	2754	91.19	91.19
1	266	8.81	100.00
Total	3020	100.00	

Table A9 Tabulation of BOTH_STR of FULL_NoR&D-302

BOTH_STR	Freq.	Percent	Cum.
0	2194	72.65	72.65
1	826	27.35	100.00
Total	3020	100.00	

Table A10 Tabulation of NEITHER_STR of FULL_NoR&D-302

NEITHER_STR	Freq.	Percent	Cum.
0	1499	49.64	49.64
1	1521	50.36	100.00
Total	3020	100.00	

Appendix 20

Table A11 Tabulation of ESG_STRA of FULL_NOASSETS-283

ESG_STRA	Freq.	Percent	Cum.
0	525	18.55	18.55
1	2305	81.45	100.00
Total	2830	100.00	

Table A12 Tabulation of MERGER_STR of FULL_NOASSETS-283

MERGER_STR	Freq.	Percent	Cum.
0	1695	59.89	59.89
1	1135	40.11	100.00
Total	2830	100.00	

Table A13 Tabulation of S_MERGER_STR of FULL_NOASSETS-283

S_MERGER_STR	Freq.	Percent	Cum.
0	2442	86.29	86.29
1	388	13.71	100.00
Total	2830	100.00	

Table A14 Tabulation of DEMERGER_STR of FULL_NOASSETS-283

DEMERGER_STR	Freq.	Percent	Cum.
0	1830	64.66	64.66
1	1000	35.34	100.00
Total	2830	100.00	

Table A15 Tabulation of S_DEMERGER_STR of FULL_NOASSETS-283

S_DEMERGER_STR	Freq.	Percent	Cum.
0	2577	91.06	91.06
1	253	8.94	100.00
Total	2830	100.00	

Table A16 Tabulation of BOTH_STR of FULL_NOASSETS-283

BOTH_STR	Freq.	Percent	Cum.
0	2083	73.60	73.60
1	747	26.40	100.00
Total	2830	100.00	

Table A17 Tabulation of NEITHER_STR of FULL_NOASSETS-283

NEITHER_STR	Freq.	Percent	Cum.
0	1388	49.05	49.05
1	1442	50.95	100.00
Total	2830	100.00	

Appendix 21

Table A18 Tabulation of ESG_STRA of FULL-271

ESG_STRA	Freq.	Percent	Cum.
0	488	18.01	18.01
1	2222	81.99	100.00
Total	2710	100.00	

Table A19 Tabulation of MERGER_STR of FULL-271

MERGER_STR	Freq.	Percent	Cum.
0	1600	59.04	59.04
1	1110	40.96	100.00
Total	2710	100.00	

Table A20 Tabulation of S_MERGER_STR of FULL-271

S_MERGER_STR	Freq.	Percent	Cum.
0	2332	86.05	86.05
1	378	13.95	100.00
Total	2710	100.00	

Table A21 Tabulation of DEMERGER_STR of FULL-271

DEMERGER_STR	Freq.	Percent	Cum.
0	1739	64.17	64.17
1	971	35.83	100.00
Total	2710	100.00	

Table A22 Tabulation of S_DEMERGER_STR of FULL-271

S_DEMERGER_STR	Freq.	Percent	Cum.
0	2471	91.18	91.18
1	239	8.82	100.00
Total	2710	100.00	

Table A23 Tabulation of BOTH_STR of FULL-271

BOTH_STR	Freq.	Percent	Cum.
0	1978	72.99	72.99
1	732	27.01	100.0
Total	2710	100.0	

Table A24 Tabulation of NEITHER_STR of FULL-271

NEITHER_STR	Freq.	Percent	Cum.
0	1349	49.78	49.78
1	1361	50.22	100.00
Total	2710	100.00	

Appendix 22

Table A25 Pairwise Correlation Table of FULL_NoR&D-302 with* p<.05

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) MERGER_STR	1																						
(2) S_MERGER_STR	0,475*	1																					
(3) DEMERGER_STR	0,533*	-0,297*	1																				
(4) S_DEMERGER_STR	-0,258*	-0,123*	0,413*	1																			
(5) BOTH_STR	0,739*	-0,242*	0,815*	-0,191*	1																		
(6) NEITHER_STR	-0,837*	-0,398*	-0,758*	-0,313*	-0,618*	1																	
(7) ESG_SCORE	0,219*	-0,027	0,268*	0,042*	0,262*	-0,239*	1																
(8) E_SCORE	0,180*	-0,045*	0,251*	0,060*	0,232*	-0,210*	0,806*	1															
(10) S_SCORE	0,161*	-0,027	0,207*	0,039*	0,198*	-0,181*	0,793*	0,637*	1														
(11) G_SCORE	0,176*	0,004	0,178*	0,003	0,190*	-0,174*	0,716*	0,297*	0,318*	1													
(12) NR_MERGERS	0,601*	0,127*	0,433*	-0,155*	0,565*	-0,503*	0,187*	0,128*	0,147*	0,169*	1												
(13) CUM_MERGERS	0,601*	0,127*	0,433*	-0,155*	0,565*	-0,503*	0,187*	0,128*	0,147*	0,169*	1,000*	1											
(14) NR_DEMERGERS	0,434*	-0,196*	0,658*	0,127*	0,629*	-0,499*	0,297*	0,268*	0,227*	0,215*	0,483*	0,483*	1										
(15) CUM_DEMERGERS	0,431*	-0,052*	0,502*	0,040*	0,515*	-0,447*	0,336*	0,254*	0,281*	0,249*	0,511*	0,511*	0,691*	1									
(16) PROFIT	0,189*	-0,069*	0,210*	-0,055*	0,261*	-0,155*	0,362*	0,306*	0,295*	0,269*	0,297*	0,297*	0,332*	0,366*	1								
(17) REVENUE	0,214*	-0,105*	0,254*	-0,067*	0,317*	-0,172*	0,409*	0,381*	0,347*	0,255*	0,334*	0,334*	0,420*	0,429*	0,760*	1							
(18) CAPEX	0,097*	-0,085*	0,138*	-0,037*	0,172*	-0,074*	0,293*	0,291*	0,256*	0,161*	0,142*	0,142*	0,215*	0,206*	0,639*	0,727*	1						
(19) FTE	0,240*	-0,033	0,217*	-0,089*	0,291*	-0,186*	0,308*	0,272*	0,307*	0,168*	0,328*	0,328*	0,314*	0,323*	0,434*	0,616*	0,394*	1					
(20) FIRM_AGE	-0,058*	-0,023	-0,067*	-0,040*	-0,047*	0,080*	-0,071*	-0,052*	-0,057*	-0,055*	-0,039*	-0,039*	-0,031	-0,031	-0,013	0,004	-0,02	-0,004	1				
(21) ESG_INNOV	0,183*	-0,01	0,208*	0,023	0,209*	-0,193*	0,525*	0,690*	0,333*	0,219*	0,156*	0,156*	0,245*	0,240*	0,240*	0,342*	0,239*	0,261*	0,005	1			
(22) ESG_STRA	0,075*	-0,025	0,114*	0,033	0,102*	-0,092*	0,406*	0,378*	0,351*	0,238*	0,071*	0,071*	0,128*	0,133*	0,165*	0,187*	0,145*	0,134*	-0,039*	0,198*	1		
(23) COUNTRY_D	0,024	-0,005	0,047*	0,032	0,03	-0,041*	0,123*	0,075*	0,194*	0,046*	0,018	0,018	0,053*	0,051*	-0,017	-0,022	-0,01	-0,013	0,130*	0,057*	0,025	1	
(24) SECTOR_D	-0,107*	-0,013	-0,108*	-0,012	-0,108*	0,112*	0,03	-0,040*	0,088*	0,033	-0,073*	-0,073*	-0,142*	-0,134*	-0,019	-0,084*	-0,016	-0,021	-0,065*	-0,168*	0,026	0,01	1

Table A26 Pairwise Correlation Table of FULL_NOASSETS-283 with* p<.05

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1) MERGER_STR	1																							
(2) S_MERGER_STR	0,487*	1																						
(3) DEMERGER_STR	0,522*	-0,295*	1																					
(4) S_DEMERGER_STR	-0,256*	-0,125*	0,424*	1																				
(5) BOTH_STR	0,732*	-0,239*	0,810*	-0,188*	1																			
(6) NEITHER_STR	-0,834*	-0,406*	-0,753*	-0,319*	-0,610*	1																		
(7) ESG_SCORE	0,192*	0	0,245*	0,043*	0,238*	-0,213*	1																	
(8) E_SCORE	0,154*	-0,049*	0,230*	0,060*	0,210*	-0,186*	0,795*	1																
(9) S_SCORE	0,142*	0	0,186*	0	0,179*	-0,160*	0,791*	0,628*	1															
(10) G_SCORE	0,155*	0	0,163*	0	0,171*	-0,157*	0,713*	0,281*	0,309*	1														
(11) NR_MERGERS	0,605*	0,142*	0,425*	-0,155*	0,562*	-0,504*	0,159*	0,110*	0,124*	0,142*	1													
(12) CUM_MERGERS	0,605*	0,142*	0,425*	-0,155*	0,562*	-0,504*	0,159*	0,110*	0,124*	0,142*	1,000*	1												
(13) NR_DEMERGERS	0,424*	-0,197*	0,667*	0,153*	0,624*	-0,503*	0,273*	0,255*	0,206*	0,189*	0,451*	0,451*	1											
(14) CUM_DEMERGERS	0,439*	-0,039*	0,507*	0,049*	0,519*	-0,458*	0,323*	0,253*	0,268*	0,227*	0,493*	0,493*	0,686*	1										
(15) RD	0,064*	0	0,079*	0	0,082*	-0,066*	0,164*	0,131*	0,157*	0,103*	0	0	0,058*	0,066*	1									
(16) PROFIT	0,167*	-0,062*	0,180*	-0,060*	0,234*	-0,130*	0,339*	0,295*	0,275*	0,243*	0,265*	0,265*	0,282*	0,301*	0,180*	1								
(17) REVENUE	0,181*	-0,103*	0,219*	-0,069*	0,282*	-0,138*	0,395*	0,386*	0,330*	0,229*	0,279*	0,279*	0,353*	0,350*	0,133*	0,754*	1							
(18) CAPEX	0,092*	-0,086*	0,134*	-0,037*	0,169*	-0,069*	0,293*	0,289*	0,249*	0,164*	0,142*	0,142*	0,223*	0,219*	0,060*	0,664*	0,783*	1						
(19) FTE	0,235*	0	0,206*	-0,093*	0,283*	-0,178*	0,295*	0,259*	0,292*	0,163*	0,328*	0,328*	0,307*	0,326*	0,126*	0,428*	0,634*	0,385*	1					
(20) FirmAge	-0,064*	0	-0,073*	-0,040*	-0,053*	0,086*	-0,076*	-0,061*	-0,062*	-0,054*	-0,045*	-0,045*	-0,037*	-0,038*	0	0	0	0	0	1				
(21) ESG_INNOV	0,159*	0	0,182*	0	0,183*	-0,169*	0,494*	0,666*	0,310*	0,194*	0,143*	0,143*	0,225*	0,236*	0,080*	0,221*	0,343*	0,236*	0,252*	0	1			
(22) ESG_STRA	0,068*	0	0,106*	0	0,094*	-0,085*	0,408*	0,384*	0,354*	0,232*	0,062*	0,062*	0,120*	0,127*	0,077*	0,154*	0,182*	0,148*	0,133*	-0,038*	0,188*	1		
(23) COUNTRY_D	0	0	0	0,037*	0	0	0,102*	0,054*	0,198*	0	0	0	0,041*	0,044*	0,043*	0	0	0	0	0,136*	0	0	1	
(24) SECTOR_D	-0,105*	0	-0,099*	0	-0,100*	0,110*	0,038*	0	0,087*	0,047*	-0,082*	-0,082*	-0,138*	-0,139*	0,053*	0	-0,100*	0	0	-0,068*	-0,155*	0	0	1

Table A27 Pairwise Correlation Table of FULL-271 with* p<.05

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25
(1) MERGER_STR	1																								
(2) S_MERGER_STR	0,483*	1																							
(3) DEMERGER_STR	0,523*	-0,301*	1																						
(4) S_DEMERGER_STR	-0,259*	-0,125*	0,416*	1																					
(5) BOTH_STR	0,730*	-0,245*	0,814*	-0,189*	1																				
(6) NEITHER_STR	-0,837*	-0,404*	-0,751*	-0,312*	-0,611*	1																			
(7) ESG_SCORE	0,185*	-0,040*	0,244*	0,044*	0,236*	-0,207*	1																		
(8) E_SCORE	0,143*	-0,062*	0,227*	0,062*	0,206*	-0,175*	0,791*	1																	
(9) S_SCORE	0,137*	-0,03	0,186*	0,038*	0,176*	-0,157*	0,793*	0,632*	1																
(10) G_SCORE	0,153*	-0,005	0,165*	0,008	0,173*	-0,155*	0,710*	0,272*	0,305*	1															
(11) NR_MERGERS	0,604*	0,137*	0,428*	-0,156*	0,562*	-0,505*	0,153*	0,100*	0,119*	0,140*	1														
(12) CUM_MERGERS	0,604*	0,137*	0,428*	-0,156*	0,562*	-0,505*	0,153*	0,100*	0,119*	0,140*	1,000*	1													
(13) NR_DEMERGERS	0,425*	-0,201*	0,668*	0,147*	0,627*	-0,501*	0,272*	0,253*	0,206*	0,190*	0,451*	0,451*	1												
(14) CUM_DEMERGERS	0,437*	-0,044*	0,510*	0,050*	0,518*	-0,458*	0,321*	0,248*	0,264*	0,228*	0,489*	0,489*	0,687*	1											
(15) RD	0,105*	0,003	0,098*	-0,013	0,114*	-0,096*	0,176*	0,130*	0,149*	0,133*	0,077*	0,077*	0,066*	0,083*	1										
(16) PROFIT	0,162*	-0,066*	0,178*	-0,062*	0,231*	-0,124*	0,337*	0,289*	0,270*	0,244*	0,260*	0,260*	0,279*	0,296*	0,153*	1									
(17) REVENUE	0,179*	-0,107*	0,221*	-0,069*	0,282*	-0,137*	0,400*	0,392*	0,329*	0,236*	0,275*	0,275*	0,353*	0,347*	0,146*	0,755*	1								
(18) CAPEX	0,087*	-0,090*	0,132*	-0,037	0,166*	-0,065*	0,291*	0,289*	0,246*	0,163*	0,136*	0,136*	0,220*	0,214*	0,061*	0,663*	0,783*	1							
(19) FTE	0,234*	-0,031	0,206*	-0,095*	0,283*	-0,176*	0,294*	0,256*	0,288*	0,164*	0,324*	0,324*	0,305*	0,322*	0,138*	0,425*	0,632*	0,381*	1						
(20) FIRM_AGE	-0,042*	-0,01	-0,057*	-0,037	-0,038*	0,062*	-0,097*	-0,088*	-0,107*	-0,037	-0,033	-0,033	-0,024	-0,024	0,03	-0,016	-0,011	-0,013	-0,001	1					
(21) ASSETS	0,136*	-0,077*	0,171*	-0,041*	0,211*	-0,111*	0,224*	0,224*	0,148*	0,153*	0,254*	0,254*	0,452*	0,441*	0,018	0,357*	0,421*	0,208*	0,221*	0,019	1				
(22) ESG_INNOV	0,167*	-0,007	0,196*	0,033	0,190*	-0,183*	0,494*	0,673*	0,307*	0,191*	0,142*	0,142*	0,231*	0,238*	0,116*	0,220*	0,346*	0,234*	0,251*	-0,016	0,243*	1			
(23) ESG_STRA	0,054*	-0,033	0,100*	0,034	0,086*	-0,073*	0,397*	0,370*	0,347*	0,223*	0,056*	0,056*	0,116*	0,122*	0,080*	0,150*	0,178*	0,147*	0,128*	-0,058*	0,107*	0,190*	1		
(24) COUNTRY_D	0,006	-0,002	0,027	0,034	0,008	-0,025	0,087*	0,035	0,178*	0,018	0,01	0,01	0,039*	0,042*	0,105*	-0,031	-0,031	-0,01	-0,023	0,119*	0,011	0,017	0,004	1	
(25) SECTOR_D	-0,106*	-0,023	-0,098*	-0,01	-0,100*	0,110*	0,021	-0,063*	0,080*	0,038*	-0,083*	-0,083*	-0,139*	-0,142*	0,084*	-0,005	-0,106*	-0,017	-0,021	-0,102*	-0,218*	-0,181*	0,02	0,018	1

Appendix23

Figure A4 Histogram RD of FULL_NOASSETS-283

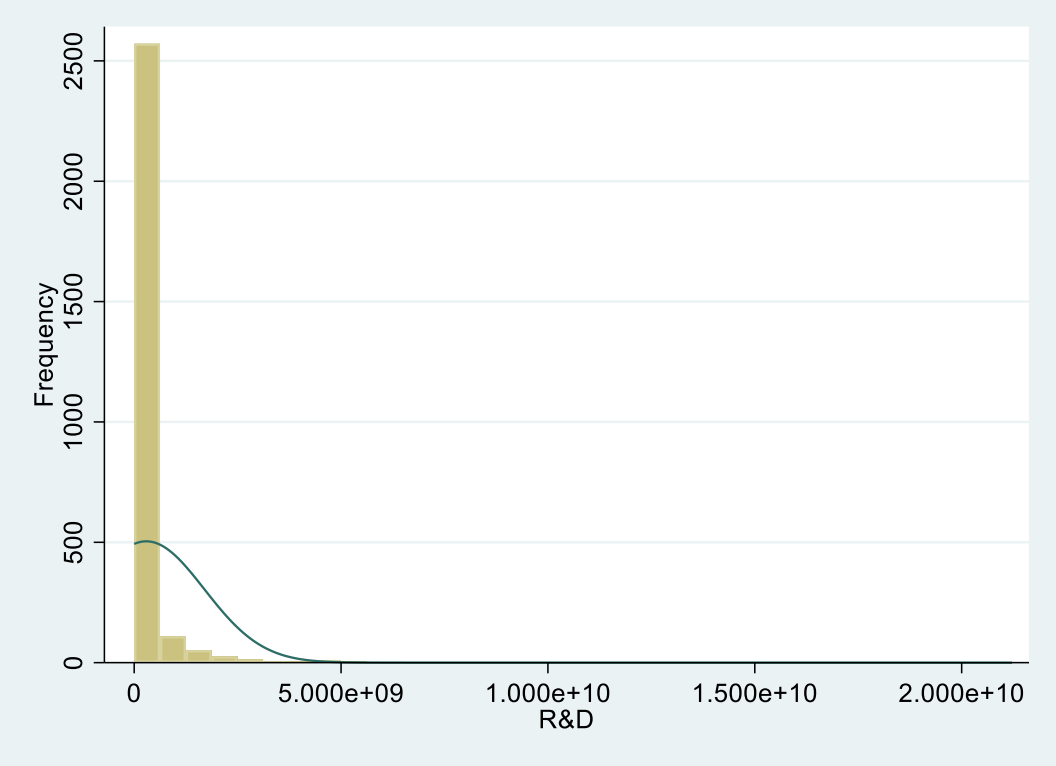


Figure A5 Histogram logRD of FULL_NOASSETS-283

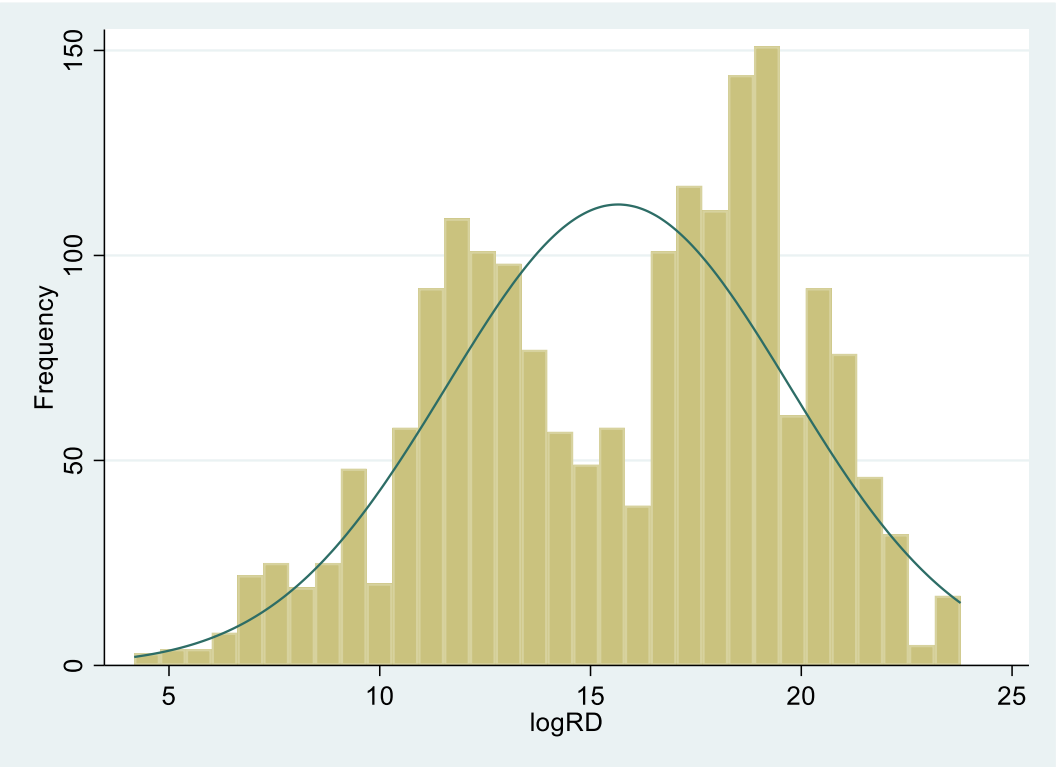


Figure A6 Histogram PROFIT of FULL_NOASSETS-283

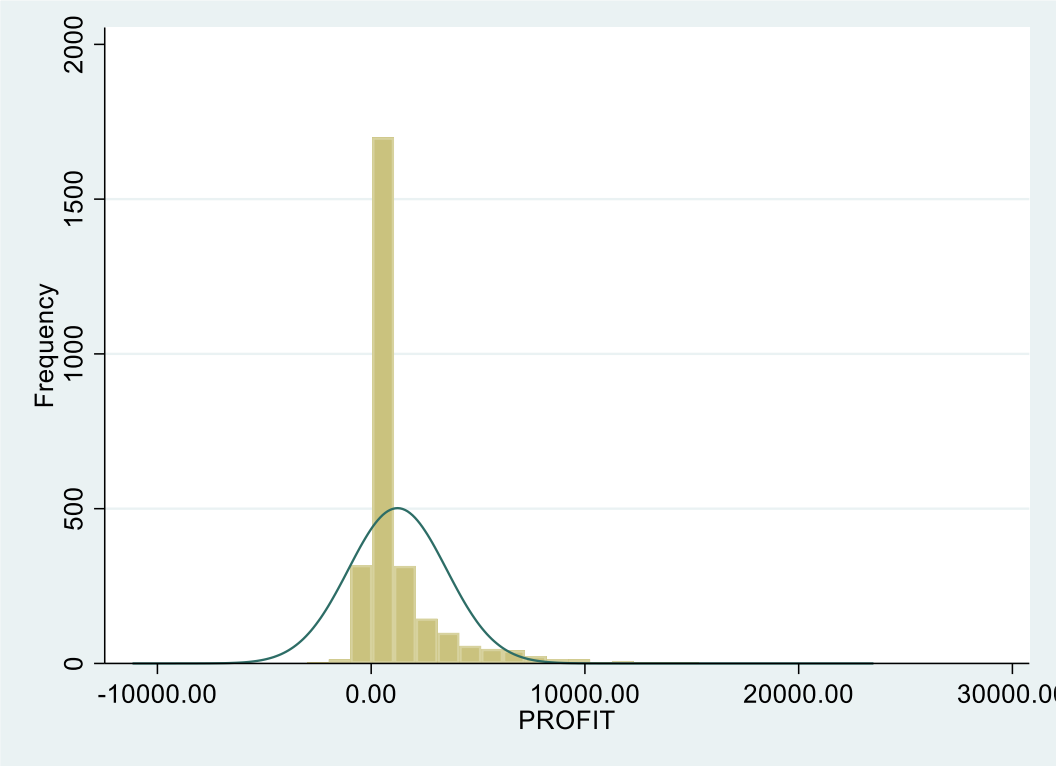


Figure A7 Histogram logPROFIT of FULL_NOASSETS-283

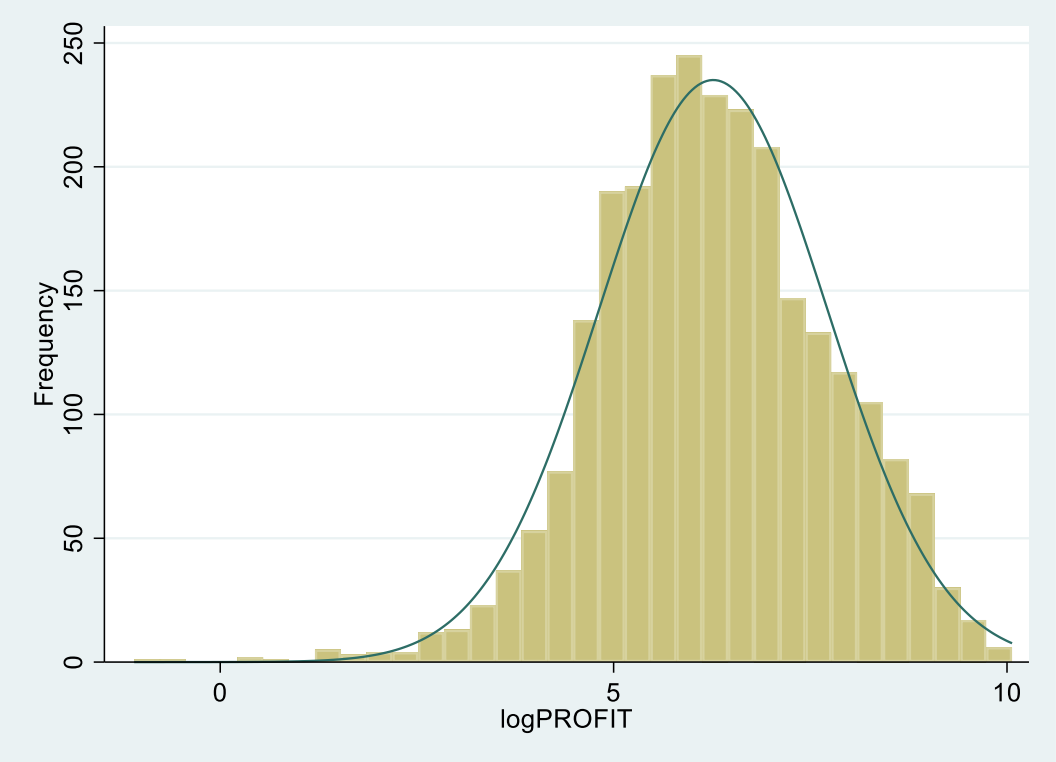


Figure A8 Histogram REVENUE of FULL_NOASSETS-283

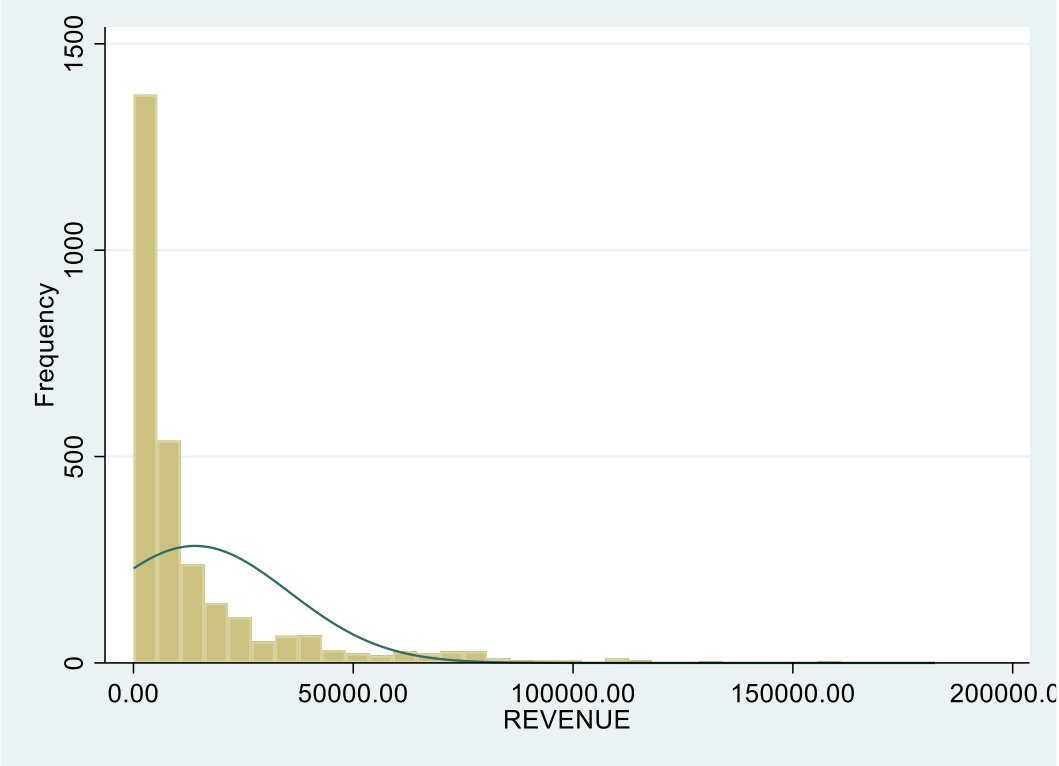


Figure A9 Histogram logREVENUE of FULL_NOASSETS-283

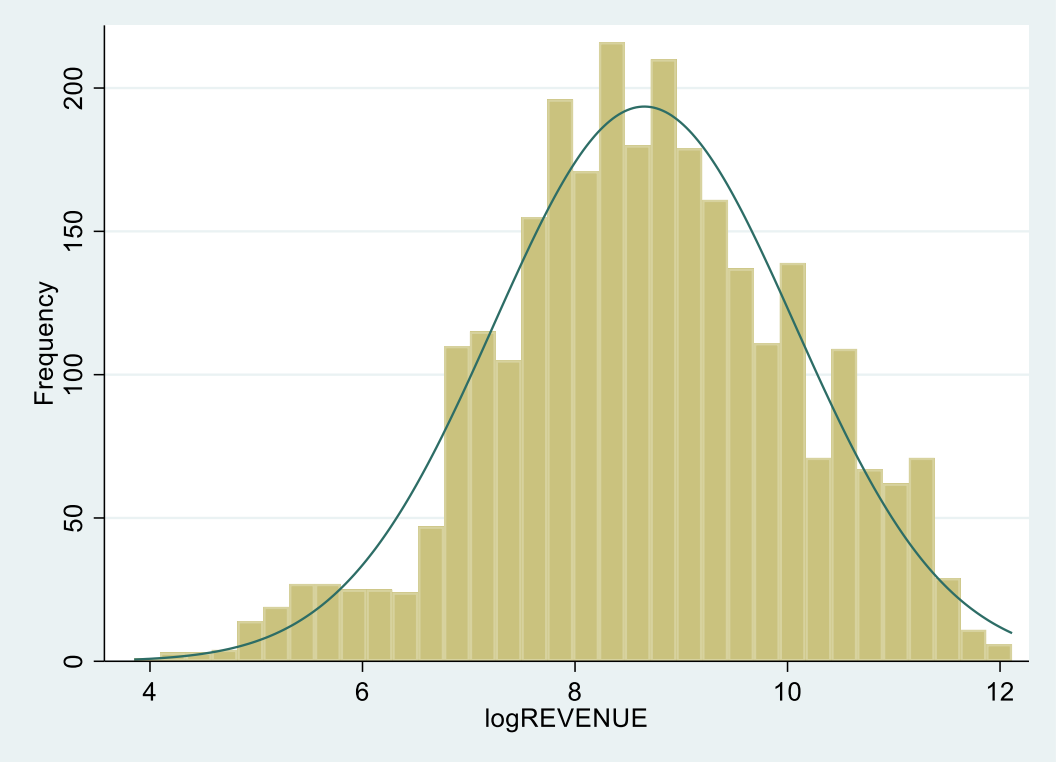


Figure A10 Histogram CAPEX of FULL_NOASSETS-283

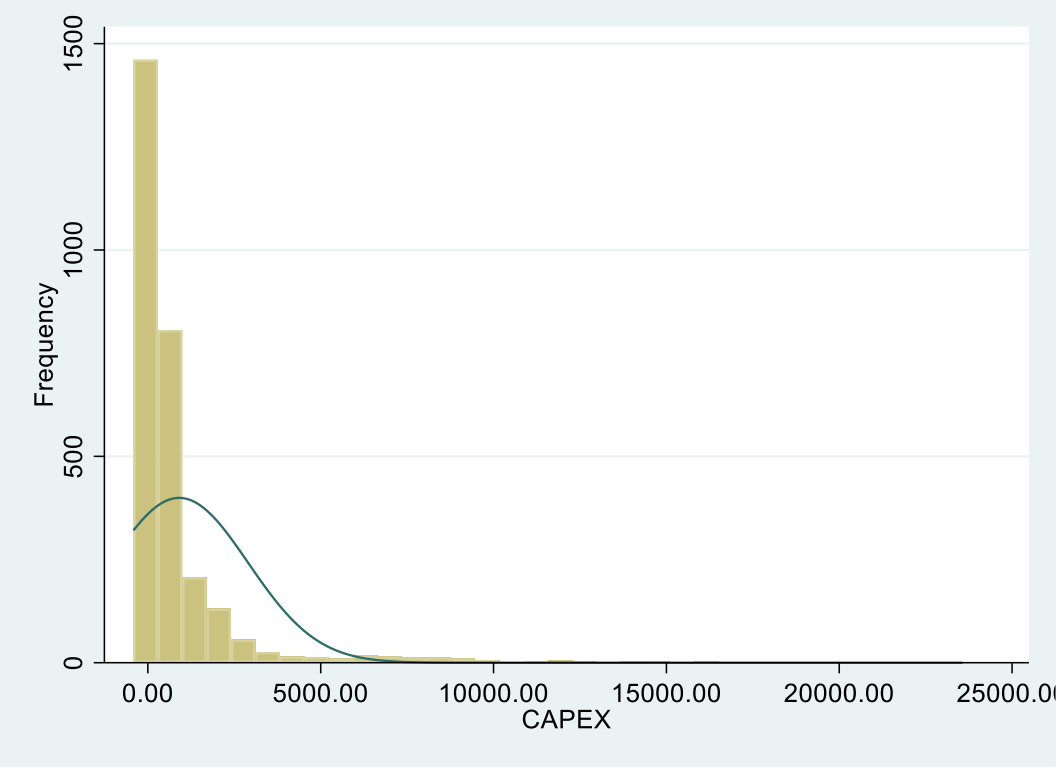


Figure A11 Histogram logCAPEX of FULL_NOASSETS-283

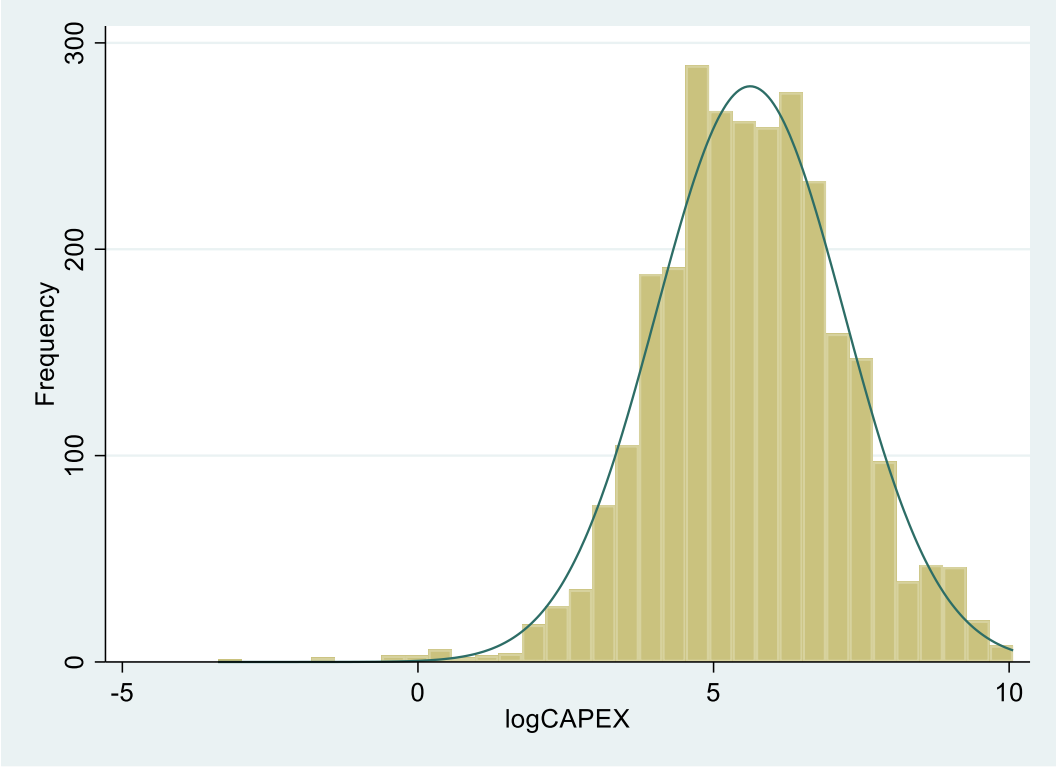


Figure A12 Histogram FTE of FULL_NOASSETS-283

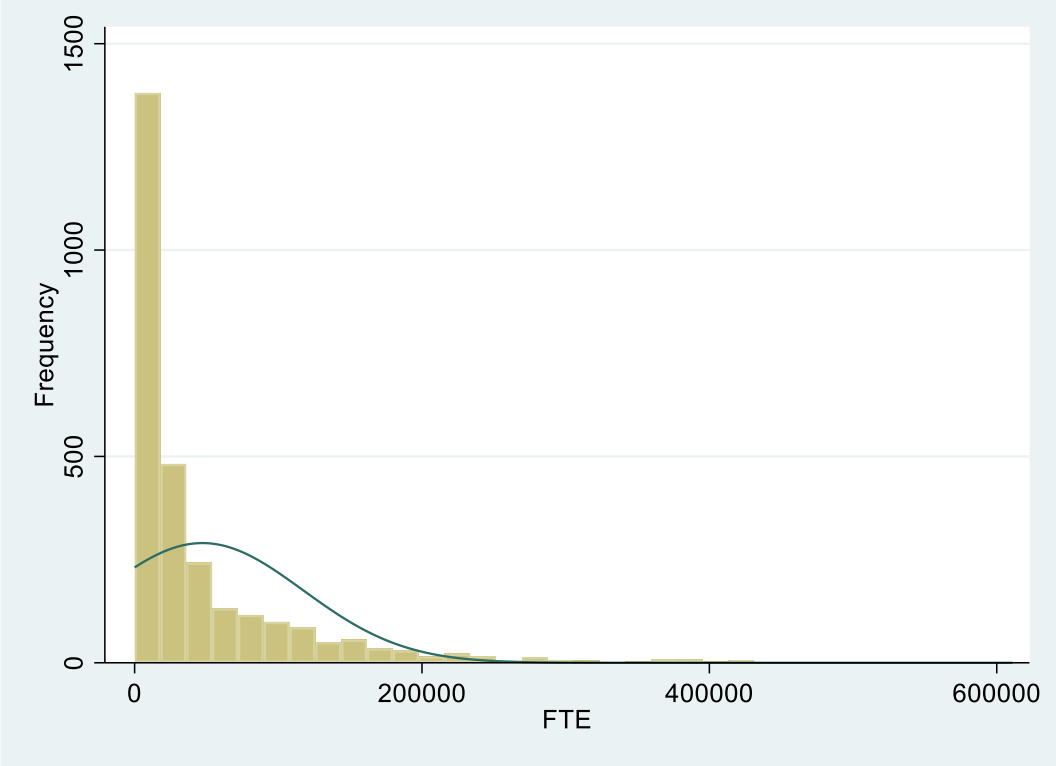
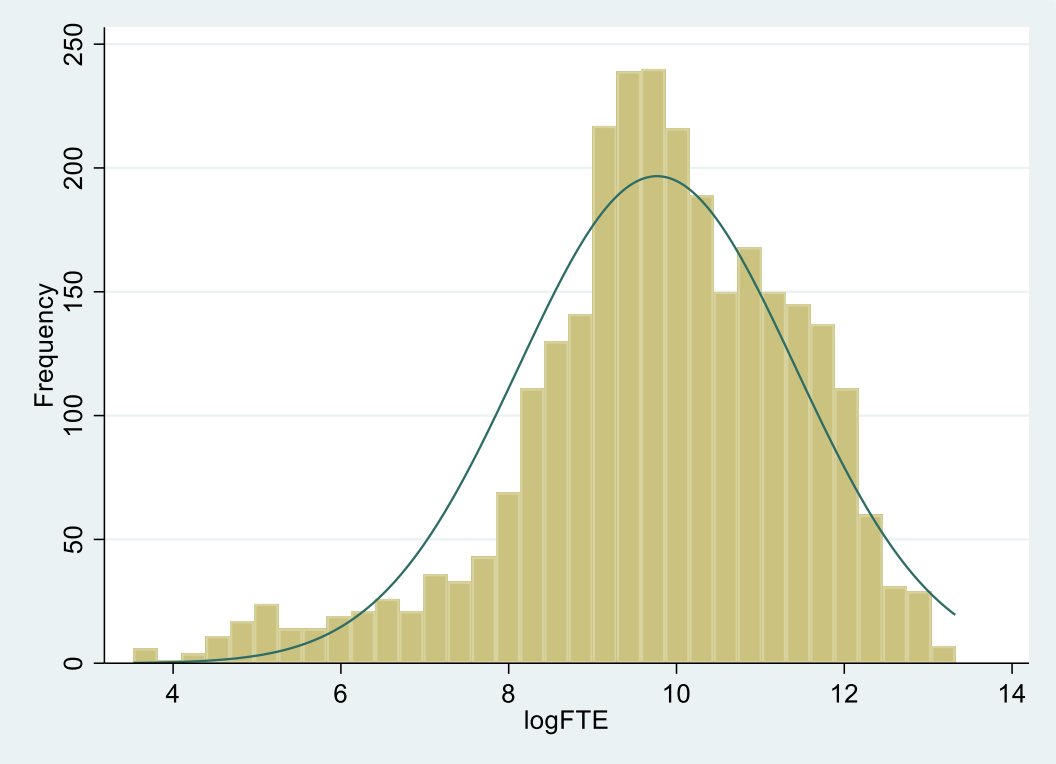


Figure A13 Histogram logFTE of FULL_NOASSETS-283



Appendix 24

Figure A14 Histogram ASSETS of FULL-271

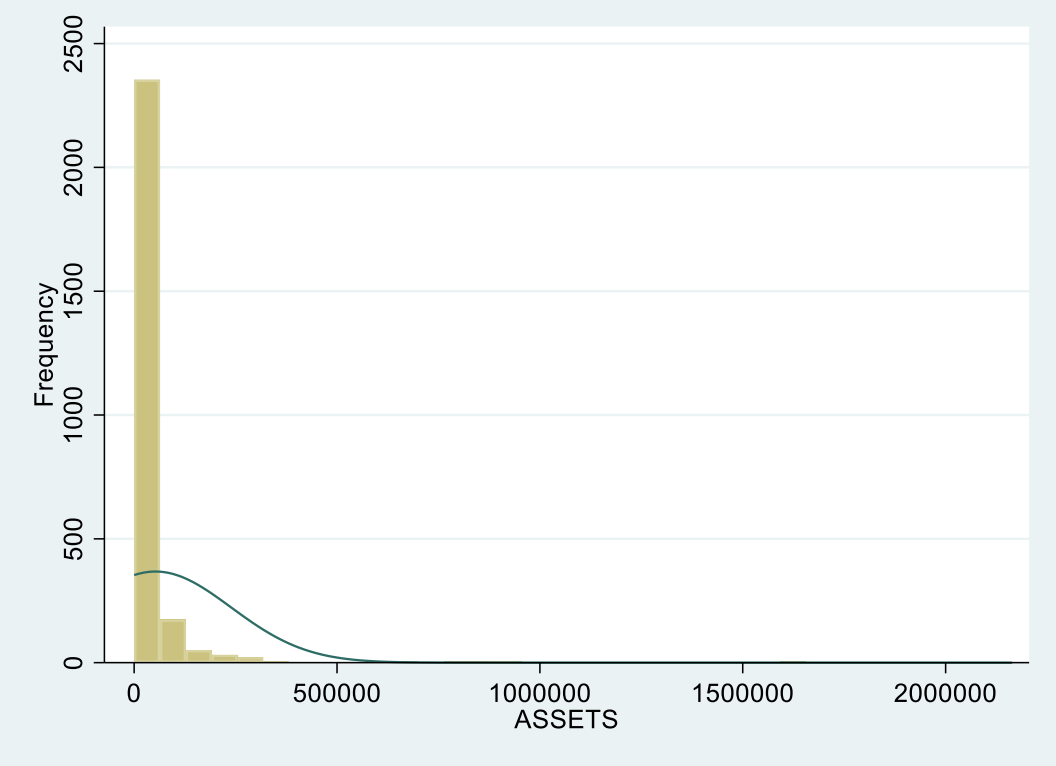
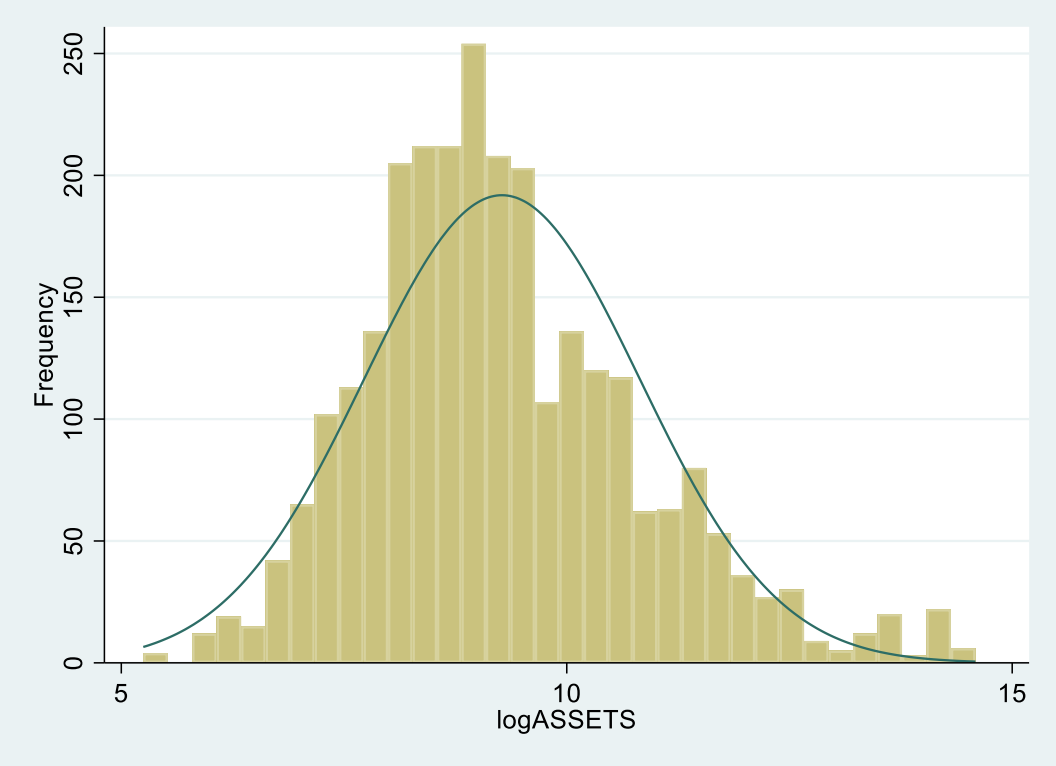


Figure A15 Histogram logRD of FULL-271



Appendix 25

Table A28 Pooled OLS Regression MODEL 1.A.1

ESG_INNOV	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	1.664	2.217	0.75	.453	-2.683	6.012	
S_MERGER_STR	2.818	2.593	1.09	.277	-2.266	7.901	
DEMERGER_STR	5.537	2.014	2.75	.006	1.588	9.485	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGER_STR	-.284	.219	-1.30	.193	-.713	.144	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.144	.307	-0.47	.639	-.747	.458	
CUM_DEMERGERS	.096	.061	1.58	.114	-.023	.215	
PROFIT	3.92e-06	.0003369	0.01	0.991	-.0006567	.0006646	
REVENUE	.0003765	.0000556	6.77	0.000	.0002675	.0004854	***
CAPEX	-.0003511	.0003789	-0.93	0.354	-.0010942	.0003919	
FTE	.0000345	.0000127	2.72	0.007	9.61e-06	.0000594	***
FIRM_AGE	.006	.003	2.43	.015	.001	.011	**
ESG_STRA	5.156	1.62	3.18	.001	1.98	8.333	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	43.559	4.511	9.66	0	34.715	52.403	***
Mean dependent var	48.137	SD dependent var	33.016				
R-squared	0.391	Number of obs	3020				
F-test	51.648	Prob > F	0.000				
Akaike crit. (AIC)	28329.258	Bayesian crit. (BIC)	28732.130				
*** p<.01, ** p<.05, * p<.1							

Table A29 Pooled OLS Regression MODEL 1.B.1

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	-.546	1.19	-0.46	.646	-2.879	1.787	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
BOTH_STR	1.978	.947	2.09	.037	.122	3.835	**
NEITHER_STR	-3.969	.96	-4.14	0	-5.851	-2.087	***
NR_MERGER	-.571	.131	-4.36	0	-.828	-.315	***
o	0	.	.	.	.	.	
NR_DEMERGERS	-.074	.143	-0.52	.604	-.355	.207	
CUM_DEMERGERS	.189	.027	7.07	0	.137	.241	***
PROFIT	6.50e-07	1.45e-07	4.49	0.000	3.66e-07	9.34e-07	***
REVENUE	1.46e-07	2.04e-08	7.19	0.000	1.07e-07	1.86e-07	***
CAPEX	-6.44e-08	1.48e-07	-0.43	0.664	-3.55e-07	2.26e-07	
FTE	.0000161	5.00e-06	3.21	0.001	6.27e-06	.0000259	***
FIRM_AGE	-.005	.002	-2.58	.01	-.009	-.001	**
ESG_STRA	13.667	.678	20.15	0	12.337	14.997	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	43.096	1.201	35.89	0	40.742	45.45	***
Mean dependent var	61941,00	SD dependent var	16723,00				
R-squared	0.344	Number of obs	3020,00				
F-test	129439,00	Prob > F	0.000				
Akaike crit. (AIC)	24337936,00	Bayesian crit. (BIC)	24428131,00				
*** p<.01, ** p<.05, * p<.1							

Table A30 Pooled OLS Regression MODEL 1.C.1

E_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	1.96	1.199	1.63	.102	-.391	4.31	
S_MERGER_STR	3.236	1.469	2.20	.028	.356	6.116	**
DEMERGER_STR	5.44	1.147	4.74	0	3.192	7.688	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGER_STR	-.535	.137	-3.90	0	-.804	-.266	***
o	0	.	.	.	.	.	
NR_DEMERGERS	.166	.192	0.86	.388	-.211	.543	
CUM_DEMERGERS	.093	.039	2.41	.016	.017	.169	**
PROFIT	.0003123	.0001865	1.67	0.094	-.0000534	.000678	*
REVENUE	.0002811	.0000331	8.49	0.000	.0002162	.0003461	***
CAPEX	-.0007118	.0002428	-2.93	0.003	-.001188	-.0002356	***
FTE	-1.01e-07	7.15e-06	-0.01	0.989	-.0000141	.0000139	
FIRM_AGE	.004	.002	2.20	.028	0	.007	**
ESG_STRA	14.198	1.038	13.67	0	12.162	16.233	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	38.69	2.802	13.81	0	33.197	44.183	***
Mean dependent var	64.901	SD dependent var	21.849				
R-squared	0.487	Number of obs	3020				
F-test	59.580	Prob > F	0.000				
Akaike crit. (AIC)	25317.949	Bayesian crit. (BIC)	25720.821				
*** p<.01, ** p<.05, * p<.1							

Table A31 Pooled OLS Regression MODEL 1.D.1

S_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	-.095	1.24	-0.08	.939	-2.527	2.338	
S_MERGER_STR	3.164	1.497	2.11	.035	.229	6.098	**
DEMERGER_STR	4.165	1.19	3.50	0	1.832	6.497	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGER_STR	-.359	.141	-2.54	.011	-.636	-.081	**
o	0	.	.	.	.	.	
NR_DEMERGERS	-.384	.174	-2.20	.028	-.725	-.042	**
CUM_DEMERGERS	.283	.029	9.68	0	.226	.34	***
PROFIT	.000108	.0001669	0.65	0.518	-.0002192	.0004352	
REVENUE	.0001521	.0000237	6.42	0.000	.0001056	.0001986	***
CAPEX	-3.81e-06	.0001818	-0.02	0.983	-.0003603	.0003527	
FTE	.0000364	6.06e-06	6.00	0.000	.0000245	.0000483	***
FIRM_AGE	.001	.002	0.63	.528	-.002	.004	
ESG_STRA	11.521	.949	12.14	0	9.661	13.382	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	36.523	2.718	13.44	0	31.193	41.852	***
Mean dependent var	66.450	SD dependent var	20.422				
R-squared	0.437	Number of obs	3020				
F-test	53.481	Prob > F	0.000				
Akaike crit. (AIC)	25189.075	Bayesian crit. (BIC)	25591.947				
*** p<.01, ** p<.05, * p<.1							

Table A32 Pooled OLS Regression MODEL 1.E.1

G_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	1.599	1.506	1.06	.288	-1.353	4.552	
S_MERGER_STR	2.072	1.826	1.14	.256	-1.507	5.652	
DEMERGER_STR	1.137	1.402	0.81	.418	-1.613	3.886	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGER_STR	-.022	.18	-0.12	.901	-.376	.331	
o	0	.	.	.	.	.	
NR_DEMERGERS	.029	.223	0.13	.897	-.408	.465	
CUM_DEMERGERS	.164	.034	4.76	0	.096	.231	***
PROFIT	.0013325	.0002435	5.47	0.000	.0008549	.00181	***
REVENUE	.0000511	.000033	1.55	0.122	-.0000136	.0001157	
CAPEX	-.0006855	.0002662	-2.58	0.010	-.0012075	-.0001635	**
FTE	.0000182	7.26e-06	2.51	0.012	3.98e-06	.0000325	**
FIRM_AGE	-.004	.002	-2.34	.019	-.008	-.001	**
ESG_STRA	9.799	1.094	8.96	0	7.655	11.944	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	37.647	3.752	10.04	0	30.292	45.003	***
Mean dependent var	55.001	SD dependent var	21.572				
R-squared	0.233	Number of obs	3020				
F-test	40.559	Prob > F	0.000				
Akaike crit. (AIC)	26453.135	Bayesian crit. (BIC)	26856.007				

*** p<.01, ** p<.05, * p<.1

Appendix 26

Table A33 Pooled OLS Regression MODEL 1.A.2

ESG_INNOV	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	.055	2.279	0.02	.981	-4.415	4.524	
S_MERGER_STR	3.27	2.66	1.23	.219	-1.945	8.486	
DEMERGER_STR	4.918	2.07	2.38	.018	.86	8.976	**
o	0	.	.	.	.	.	
BOTH_STR	0	.	.	.	.	.	
NEITHER_STR	0	.	.	.	.	.	
NR_MERGER	-.218	.229	-0.95	.341	-.666	.231	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.259	.321	-0.81	.42	-.888	.37	
CUM_DEMERGERS	.206	.054	3.85	0	.101	.311	***
RD	1.12e-09	3.96e-10	2.83	0.005	3.46e-10	1.90e-09	
PROFIT	-.0004197	.0003743	-1.12	0.262	-.0011537	.0003143	
REVENUE	.0004147	.0000591	7.02	0.000	.0002989	.0005306	
CAPEX	-.0004029	.0003676	-1.10	0.273	-.0011237	.0003179	
FTE	.0000243	.000013	1.87	0.062	-1.19e-06	.0000498	
FIRM_AGE	.0029979	.0027986	1.07	0.284	-.0024897	.0084855	
ESG_STRA	2.809.965	1.644.493	1.71	0.088	-.4145957	6.034.526	
COUNTRY_D	YES						
SECTOR_D	YES						
_cons	4.867.452	4.634.574	10.50	0.000	3.958.694	5.776.211	
Mean dependent var	47.999	SD dependent var	32.706				
R-squared	0.396	Number of obs	2829				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	26466.336	Bayesian crit. (BIC)	26864.831				
*** p<.01, ** p<.05, * p<.1							

Table A34 Pooled OLS Regression MODEL 1.B.2

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	.674	.983	0.69	.493	-1.254	2.602	
S_MERGER_STR	2.612	1.191	2.19	.028	.277	4.947	**
DEMERGER_STR	3.183	.966	3.30	.001	1.29	5.077	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGERS	-.28	.123	-2.28	.023	-.522	-.039	**
o	0	.	.	.	.	.	
NR_DEMERGERS	-.241	.146	-1.65	.099	-.526	.045	*
CUM_DEMERGERS	.254	.024	10.76	0	.208	.301	***
RD	1.08e-09	1.59e-10	6.76	0.000	7.65e-10	1.39e-09	***
PROFIT	.0002384	.0001469	1.62	0.105	-.0000497	.0005265	
REVENUE	.0001723	.0000227	7.59	0.000	.0001278	.0002169	***
CAPEX	-.0004259	.0001838	-2.32	0.021	-.0007862	-.0000656	**
FTE	.0000117	4.87e-06	2.41	0.016	2.19e-06	.0000213	**
FIRM_AGE	-.002	.001	-1.26	.206	-.005	.001	
ESG_STRA	10.871	.764	14.23	0	9.373	12.369	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	40.214	2.546	15.80	0	35.222	45.207	***
Mean dependent var	47.999	SD dependent var	32.706				
R-squared	0.396	Number of obs	2829				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	26466.336	Bayesian crit. (BIC)	26864.831				
*** p<.01, ** p<.05, * p<.1							

Table A35 Pooled OLS Regression MODEL 1.C .2

E_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	1.079	1.203	0.90	.37	-1.279	3.438	
S_MERGER_STR	3.521	1.483	2.37	.018	.613	6.429	**
DEMERGER_STR	4.912	1.158	4.24	0	2.64	7.183	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGERS	-.483	.138	-3.49	0	-.754	-.212	***
o	0	.	.	.	.	.	
NR_DEMERGERS	.129	.184	0.70	.483	-.232	.49	
CUM_DEMERGERS	.157	.031	5.07	0	.096	.217	***
RD	1.15e-09	1.82e-10	6.34	0.000	7.95e-10	1.51e-09	***
PROFIT	-.0001355	.0001918	-0.71	0.480	-.0005117	.0002406	
REVENUE	.0002983	.0000316	9.43	0.000	.0002362	.0003603	***
CAPEX	-.0005688	.0002183	-2.61	0.009	-.0009967	-.0001408	***
FTE	-8.36e-06	6.77e-06	-1.23	0.217	-.0000216	4.92e-06	
FIRM_AGE	0.0000581	.002	0.03	.973	-.003	.003	
ESG_STRA	12.442	1.014	12.27	0	10.453	14.43	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	41.286	2.893	14.27	0	35.613	46.959	***
Mean dependent var	65.351	SD dependent var	21.090				
R-squared	0.494	Number of obs	2829				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	23484.452	Bayesian crit. (BIC)	23882.947				
*** p<.01, ** p<.05, * p<.1							

Table A36 Pooled OLS Regression MODEL 1.D.2

S_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	-.031	1.29	-0.02	.981	-2.561	2.498	
S_MERGER_STR	2.866	1.548	1.85	.064	-.168	5.901	*
DEMERGER_STR	3.739	1.25	2.99	.003	1.287	6.191	***
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGERS	-.321	.153	-2.10	.036	-.621	-.021	**
o	0	.	.	.	.	.	
NR_DEMERGERS	-.569	.204	-2.79	.005	-.969	-.17	***
CUM_DEMERGERS	.326	.034	9.70	0	.26	.391	***
RD	1.44e-09	2.21e-10	6.54	0.000	1.01e-09	1.88e-09	***
PROFIT	-.0002132	.0001727	-1.23	0.217	-.0005518	.0001254	
REVENUE	.0001294	.0000277	4.68	0.000	.0000751	.0001836	***
CAPEX	.0003167	.0002004	1.58	0.114	-.0000762	.0007096	
FTE	.0000313	6.24e-06	5.01	0.000	.000019	.0000435	***
FIRM_AGE	-.002	.001	-1.23	.22	-.005	.001	
ESG_STRA	10.591	.976	10.86	0	8.678	12.504	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	36.77	2.868	12.82	0	31.146	42.393	***
Mean dependent var	66.731	SD dependent var	20.460				
R-squared	0.441	Number of obs	2829				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	23594.664	Bayesian crit. (BIC)	23993.158				
*** p<.01, ** p<.05, * p<.1							

Table A37 Pooled OLS Regression MODEL 1.E.2

G_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interv]	Sig
MERGER_STR	.883	1.548	0.57	.569	-2.152	3.917	
S_MERGER_STR	1.818	1.853	0.98	.327	-1.816	5.451	
DEMERGER_STR	.996	1.457	0.68	.494	-1.86	3.852	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
o	0	.	.	.	.	.	
NR_MERGERS	-.028	.193	-0.15	.884	-.407	.351	
o	0	.	.	.	.	.	
NR_DEMERGERS	.02	.249	0.08	.936	-.469	.509	
CUM_DEMERGERS	.205	.039	5.21	0	.128	.282	***
RD	6.72e-10	2.42e-10	2.77	0.006	1.97e-10	1.15e-09	***
PROFIT	.0011725	.0002513	4.67	0.000	.0006797	.0016654	***
REVENUE	.0000882	.0000403	2.19	0.029	9.19e-06	.0001671	**
CAPEX	-.0009735	.0003149	-3.09	0.002	-.0015908	-.0003561	***
FTE	.0000158	7.68e-06	2.05	0.040	6.98e-07	.0000308	**
FIRM_AGE	-.003	.002	-1.61	.107	-.007	.001	
ESG_STRA	9.778	1.107	8.83	0	7.607	11.949	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	41.029	3.652	11.23	0	33.867	48.19	***
Mean dependent var	54.423	SD dependent var	21.405				
R-squared	0.239	Number of obs	2829				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	24723.388	Bayesian crit. (BIC)	25121.883				
*** p<.01, ** p<.05, * p<.1							

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Table A38 Pooled OLS Regression MODEL 1.A.3

ESG_INNOV	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	3.917	5.638	0.69	.487	-7.14	14.974	
lag3S_MERGER_STR	2.303	2.098	1.10	.272	-1.812	6.418	
DEMERGER_STR	20.828	6.517	3.20	.001	8.046	33.61	***
S_DEMERGER_STR	-.229	2.663	-0.09	.932	-5.452	4.995	
o	0	.	.	.	.	.	
NEITHER_STR	-1.88	1.973	-0.95	.341	-5.75	1.99	
lag3NR_MERGERS	-.013	.281	-0.05	.964	-.565	.539	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.188	.34	-0.55	.58	-.856	.479	
CUM_DEMERGERS	.174	.062	2.82	.005	.053	.295	***
logRD	.831	.296	2.81	.005	.25	1.413	***
logPROFIT	-4.592	.915	-5.02	0	-6.387	-2.796	***
logREVENUE	4.31	1.762	2.45	.015	.854	7.765	**
logCAPEX	5.543	1.203	4.61	0	3.184	7.902	***
logFTE	.338	1.627	0.21	.835	-2.854	3.53	
FIRM_AGE	.012	.004	2.69	.007	.003	.02	***
ESG_STRA	4.85	2.128	2.28	.023	.676	9.023	**
logRD *lag3MERGER_STR	-.24	.337	-0.71	.476	-.902	.421	
logRD* DEMERGER_STR	-1.266	.374	-3.38	.001	-2	-.532	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-19.561	10.323	-1.89	.058	-39.808	.687	*
Mean dependent var	53.857	SD dependent var	31.208				
R-squared	0.417	Number of obs	1732				
F-test	66.067	Prob > F	0.000				
Akaike crit. (AIC)	16030.973	Bayesian crit. (BIC)	16396.595				
*** p<.01	** p<.05,	* p<.1					

Table A39 Pooled OLS Regression MODEL 1.B.3

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	2.507	2.448	1.02	.306	-2.295	7.308	
lag3S_MERGER_STR	2.145	.903	2.38	.018	.374	3.917	**
DEMERGER_STR	3.432	2.67	1.29	.199	-1.804	8.669	
S_DEMERGER_STR	.681	1.088	0.63	.531	-1.453	2.816	
o	0	.	.	.	.	.	
NEITHER_STR	-1.228	.957	-1.28	.199	-3.104	.648	
lag3NR_MERGERS	-.297	.12	-2.48	.013	-.533	-.062	**
o	0	.	.	.	.	.	
NR_DEMERGERS	-.213	.167	-1.27	.204	-.541	.115	
CUM_DEMERGERS	.271	.027	9.84	0	.217	.325	***
logRD	.305	.128	2.38	.017	.054	.556	**
logPROFIT	1.196	.44	2.72	.007	.332	2.059	***
logREVENUE	4.389	.837	5.24	0	2.747	6.03	***
logCAPEX	1.038	.507	2.05	.041	.044	2.032	**
logFTE	-1.713	.715	-2.40	.017	-3.115	-.31	**
FIRM_AGE	.005	.002	3.20	.001	.002	.009	***
ESG_STRA	11.432	.976	11.71	0	9.518	13.346	***
logRD* lag3MERGER_STR	-.179	.145	-1.23	.218	-.465	.106	
logRD* DEMERGER_STR	-.218	.151	-1.44	.15	-.515	.079	
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	.791	5.119	0.15	.877	-9.25	10.832	
Mean dependent var	63.990	SD dependent var	16.114				
R-squared	0.524	Number of obs	1732				
F-test	47.926	Prob > F	0.000				
Akaike crit. (AIC)	13390.521	Bayesian crit. (BIC)	13756.142				
*** p<.01, ** p<.05, * p<.1							

Table A40 Pooled OLS Regression MODEL 1.C.3

E_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	4.011	3.157	1.27	.204	-2.181	10.203	
lag3S_MERGER_STR	.692	1.134	0.61	.542	-1.532	2.916	
DEMERGER_STR	8.349	3.491	2.39	.017	1.501	15.197	**
S_DEMERGER_STR	.442	1.338	0.33	.741	-2.182	3.065	
o	0	.	.	.	.	.	
NEITHER_STR	-2.228	1.17	-1.90	.057	-4.522	.067	*
lag3NR_MERGERS	-.213	.136	-1.57	.117	-.479	.053	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.002	.188	-0.01	.99	-.372	.367	
CUM_DEMERGERS	.159	.036	4.42	0	.088	.23	***
logRD	.409	.159	2.57	.01	.097	.721	**
logPROFIT	-.043	.55	-0.08	.938	-1.121	1.035	
logREVENUE	5.751	1.125	5.11	0	3.545	7.958	***
logCAPEX	3.09	.678	4.56	0	1.761	4.42	***
logFTE	-3.252	1.007	-3.23	.001	-5.227	-1.278	***
FIRM_AGE	.008	.003	2.96	.003	.003	.013	***
ESG_STRA	14.016	1.282	10.93	0	11.502	16.531	***
logRD* lag3MERGER_STR	-.227	.183	-1.24	.215	-.587	.132	
logRD* DEMERGER_STR	-.502	.197	-2.55	.011	-.888	-.116	**
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	.25	6.339	0.04	.969	-12.184	12.683	
Mean dependent var	67.717	SD dependent var	19.881				
R-squared	0.524	Number of obs	1732				
F-test	39.827	Prob > F	0.000				
Akaike crit. (AIC)	14119.139	Bayesian crit. (BIC)	14484.760				

*** p<.01, ** p<.05, * p<.1

Table A41 Pooled OLS Regression MODEL 1.D.3

S_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	-5.03	3.233	-1.56	.12	-11.371	1.31	
lag3S_MERGER_STR	1.126	1.132	0.99	.32	-1.095	3.346	
DEMERGER_STR	-1.213	3.575	-0.34	.734	-8.225	5.799	
S_DEMERGER_STR	1.814	1.372	1.32	.186	-.876	4.504	
o	0	.	.	.	.	.	
NEITHER_STR	.387	1.221	0.32	.751	-2.008	2.783	
lag3NR_MERGERS	-.308	.126	-2.45	.014	-.555	-.061	**
o	0	.	.	.	.	.	
NR_DEMERGERS	-.687	.21	-3.27	.001	-1.099	-.275	***
CUM_DEMERGERS	.339	.038	8.98	0	.265	.413	***
logRD	-.097	.158	-0.61	.539	-.408	.213	
logPROFIT	1.713	.501	3.42	.001	.731	2.695	***
logREVENUE	1.516	.937	1.62	.106	-.321	3.354	
logCAPEX	.573	.614	0.93	.351	-.632	1.778	
logFTE	2.883	.843	3.42	.001	1.23	4.536	***
FIRM_AGE	.002	.002	0.90	.37	-.002	.006	
ESG_STRA	11.307	1.258	8.99	0	8.841	13.774	***
logRD *lag3MERGER_STR	.189	.187	1.01	.312	-.177	.555	
logRD* DEMERGER_STR	.125	.198	0.63	.528	-.264	.513	
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-14.995	5.916	-2.53	.011	-26.598	-3.392	**
Mean dependent var	68.900	SD dependent var	19.364				
R-squared	0.475	Number of obs	1732				
F-test	34.210	Prob > F	0.000				
Akaike crit. (AIC)	14196.797	Bayesian crit. (BIC)	14562.418				

*** p<.01, ** p<.05, * p<.1

Table A42 Pooled OLS Regression MODEL 1.E.3

G_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	7.631	3.768	2.03	.043	.24	15.022	**
lag3S_MERGER_STR	3.655	1.525	2.40	.017	.663	6.647	**
DEMERGER_STR	5.452	4.24	1.29	.199	-2.864	13.769	
S_DEMERGER_STR	-.04	1.781	-0.02	.982	-3.534	3.453	
o	0	.	.	.	.	.	
NEITHER_STR	-2.045	1.535	-1.33	.183	-5.056	.967	
lag3NR_MERGERS	-.188	.201	-0.93	.35	-.582	.206	
o	0	.	.	.	.	.	
NR_DEMERGERS	.312	.273	1.14	.254	-.224	.847	
CUM_DEMERGERS	.233	.044	5.29	0	.147	.32	***
logRD	.605	.2	3.02	.003	.211	.998	***
logPROFIT	2.083	.657	3.17	.002	.794	3.372	***
logREVENUE	5.479	1.255	4.37	0	3.017	7.941	***
logCAPEX	-.372	.822	-0.45	.651	-1.983	1.24	
logFTE	-4.148	1.116	-3.72	0	-6.338	-1.958	***
FIRM_AGE	.006	.002	2.54	.011	.001	.01	**
ESG_STRA	9.014	1.511	5.97	0	6.051	11.977	***
logRD *lag3MERGER_STR	-.501	.227	-2.20	.028	-.946	-.055	**
logRD* DEMERGER_STR	-.429	.245	-1.75	.08	-.91	.051	*
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	13.343	7.5	1.78	.075	-1.367	28.053	*
Mean dependent var	55.997	SD dependent var	21.763				
R-squared	0.324	Number of obs	1732				
F-test	35.087	Prob > F	0.000				
Akaike crit. (AIC)	15038.706	Bayesian crit. (BIC)	15404.327				

*** p<.01, ** p<.05, * p<.1

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Table A43 Pooled OLS Regression MODEL 1.A.4

ESG_INNOV	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	11.216	11.73	0.96	.339	-11.791	34.224	
lag3S_MERGER_STR	2.331	2.075	1.12	.262	-1.74	6.402	
DEMERGER_STR	-23.723	13.27	-1.79	.074	-49.75	2.305	*
S_DEMERGER_STR	2.33	2.758	0.84	.398	-3.08	7.74	
o	0	.	.	.	.	.	
NEITHER_STR	-2.385	1.974	-1.21	.227	-6.257	1.487	
lag3NR_MERGERS	-.08	.285	-0.28	.78	-.638	.479	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.573	.353	-1.63	.104	-1.264	.118	
CUM_DEMERGERS	.16	.062	2.57	.01	.038	.282	**
logRD	.977	.299	3.27	.001	.39	1.563	***
logPROFIT	-4.739	.922	-5.14	0	-6.546	-2.931	***
logREVENUE	4.264	1.754	2.43	.015	.824	7.704	**
logCAPEX	5.546	1.196	4.64	0	3.201	7.891	***
logFTE	-.703	1.686	-0.42	.677	-4.011	2.604	
FIRM_AGE	.012	.004	2.79	.005	.004	.02	***
ESG_STRA	4.643	2.108	2.20	.028	.508	8.778	**
logRD* lag3MERGER_STR	-.171	.347	-0.49	.622	-.853	.51	
logRD* DEMERGER_STR	-1.608	.389	-4.13	0	-2.372	-.845	***
logFTE* lag3MERGER_STR	-.828	1.173	-0.71	.48	-3.129	1.473	
logFTE* DEMERGER_STR	4.922	1.322	3.72	0	2.33	7.515	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-10.092	11.092	-0.91	.363	-31.848	11.663	
Mean dependent var	53.857	SD dependent var	31.208				
R-squared	0.423	Number of obs	1732				
F-test	63.826	Prob > F	0.000				
Akaike crit. (AIC)	16017.537	Bayesian crit. (BIC)	16394.072				
*** p<.01	** p<.05	* p<.1					

Table A44 Pooled OLS Regression MODEL 1.B.4

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	4.509	4.943	0.91	.362	-5.185	14.204	
lag3S_MERGER_STR	2.151	.903	2.38	.017	.381	3.922	**
DEMERGER_STR	-8.404	5.424	-1.55	.121	-19.042	2.235	
S_DEMERGER_STR	1.36	1.109	1.23	.22	-.814	3.535	
o	0	.	.	.	.	.	
NEITHER_STR	-1.362	.961	-1.42	.157	-3.247	.523	
lag3NR_MERGERS	-.315	.122	-2.58	.01	-.553	-.076	***
o	0	.	.	.	.	.	
NR_DEMERGERS	-.315	.171	-1.84	.066	-.65	.02	*
CUM_DEMERGERS	.267	.027	9.74	0	.213	.321	***
logRD	.343	.13	2.63	.009	.088	.599	***
logPROFIT	1.157	.445	2.60	.009	.285	2.028	***
logREVENUE	4.377	.836	5.24	0	2.737	6.017	***
logCAPEX	1.039	.505	2.06	.04	.049	2.03	**
logFTE	-1.987	.751	-2.65	.008	-3.46	-.514	***
FIRM_AGE	.006	.002	3.27	.001	.002	.009	***
ESG_STRA	11.378	.971	11.71	0	9.473	13.283	***
logRD* lag3MERGER_STR	-.161	.148	-1.08	.28	-.452	.131	
logRD* DEMERGER_STR	-.309	.156	-1.98	.048	-.615	-.003	**
logFTE* lag3MERGER_STR	-.227	.475	-0.48	.632	-1.159	.705	
logFTE* DEMERGER_STR	1.308	.528	2.48	.013	.272	2.343	**
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	3.287	5.561	0.59	.555	-7.62	14.194	
Mean dependent var	63.990	SD dependent var	16.114				
R-squared	0.526	Number of obs	1732				
F-test	48.017	Prob > F	0.000				
Akaike crit. (AIC)	13388.886	Bayesian crit. (BIC)	13765.422				

**** p<.01, ** p<.05, * p<.1*

Table A45 Pooled OLS Regression MODEL 1.C.4

E_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	10.785	6.389	1.69	.092	-1.746	23.317	*
lag3S_MERGER_STR	.613	1.131	0.54	.588	-1.605	2.832	
DEMERGER_STR	-7.346	6.871	-1.07	.285	-20.822	6.129	
S_DEMERGER_STR	1.27	1.394	0.91	.362	-1.464	4.004	
o	0	.	.	.	.	.	
NEITHER_STR	-2.396	1.176	-2.04	.042	-4.703	-.089	**
lag3NR_MERGERS	-.211	.135	-1.56	.119	-.477	.054	
o	0	.	.	.	.	.	
NR_DEMERGERS	-.141	.19	-0.74	.457	-.513	.231	
CUM_DEMERGERS	.161	.036	4.45	0	.09	.232	***
logRD	.447	.163	2.74	.006	.127	.766	***
logPROFIT	-.102	.555	-0.18	.855	-1.19	.987	
logREVENUE	5.729	1.128	5.08	0	3.517	7.941	***
logCAPEX	3.09	.678	4.56	0	1.76	4.42	***
logFTE	-3.461	1.07	-3.24	.001	-5.558	-1.363	***
FIRM_AGE	.008	.003	3.03	.002	.003	.013	***
ESG_STRA	13.974	1.278	10.93	0	11.467	16.481	***
logRD* lag3MERGER_STR	-.166	.186	-0.90	.37	-.53	.197	
logRD* DEMERGER_STR	-.627	.206	-3.05	.002	-1.031	-.224	***
logFTE* lag3MERGER_STR	-.773	.597	-1.30	.195	-1.943	.398	
logFTE* DEMERGER_STR	1.744	.662	2.64	.008	.446	3.043	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	2.29	6.908	0.33	.74	-11.259	15.839	
Mean dependent var	67.717	SD dependent var	19.881				
R-squared	0.526	Number of obs	1732				
F-test	40.522	Prob > F	0.000				
Akaike crit. (AIC)	14115.945	Bayesian crit. (BIC)	14492.480				

**** p<.01, ** p<.05, * p<.1*

Table A46 Pooled OLS Regression MODEL 1.D.4

S_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	-7.286	6.412	-1.14	.256	-19.863	5.291	
lag3S_MERGER_STR	1.232	1.13	1.09	.276	-.984	3.449	
DEMERGER_STR	-15.561	7.378	-2.11	.035	-30.031	-1.09	**
S_DEMERGER_STR	2.719	1.397	1.95	.052	-.022	5.459	*
o	0	.	.	.	.	.	
NEITHER_STR	.214	1.224	0.18	.861	-2.186	2.614	
lag3NR_MERGERS	-.357	.127	-2.81	.005	-.606	-.108	***
o	0	.	.	.	.	.	
NR_DEMERGERS	-.807	.213	-3.78	0	-1.226	-.389	***
CUM_DEMERGERS	.327	.038	8.69	0	.253	.401	***
logRD	-.036	.161	-0.22	.825	-.351	.28	
logPROFIT	1.673	.503	3.33	.001	.686	2.659	***
logREVENUE	1.508	.933	1.62	.106	-.322	3.339	
logCAPEX	.576	.614	0.94	.349	-.629	1.78	
logFTE	2.374	.864	2.75	.006	.679	4.069	***
FIRM_AGE	.002	.002	0.96	.338	-.002	.006	
ESG_STRA	11.208	1.254	8.93	0	8.748	13.668	***
logRD* lag3MERGER_STR	.171	.193	0.88	.377	-.209	.55	
logRD* DEMERGER_STR	.02	.203	0.10	.923	-.378	.417	
logFTE* lag3MERGER_STR	.261	.617	0.42	.673	-.95	1.471	
logFTE* DEMERGER_STR	1.574	.684	2.30	.022	.232	2.916	**
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-10.526	6.379	-1.65	.099	-23.037	1.985	*
Mean dependent var	68.900	SD dependent var	19.364				
R-squared	0.477	Number of obs	1732				
F-test	33.720	Prob > F	0.000				
Akaike crit. (AIC)	14194.919	Bayesian crit. (BIC)	14571.454				

**** p<.01, ** p<.05, * p<.1*

Table A47 Pooled OLS Regression MODEL 1.E.4

G_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lag3MERGER_STR	10.993	7.793	1.41	.159	-4.293	26.279	
lag3S_MERGER_STR	3.597	1.532	2.35	.019	.592	6.602	**
DEMERGER_STR	2.215	9.323	0.24	.812	-16.071	20.502	
S_DEMERGER_STR	.096	1.849	0.05	.958	-3.53	3.722	
o	0	.	.	.	.	.	
NEITHER_STR	-2.075	1.537	-1.35	.177	-5.09	.94	
lag3NR_MERGERS	-.176	.205	-0.86	.391	-.577	.226	
o	0	.	.	.	.	.	
NR_DEMERGERS	.282	.281	1.00	.316	-.269	.833	
CUM_DEMERGERS	.237	.044	5.38	0	.15	.323	***
logRD	.606	.203	2.98	.003	.208	1.004	***
logPROFIT	2.068	.659	3.14	.002	.775	3.36	***
logREVENUE	5.471	1.256	4.36	0	3.008	7.935	***
logCAPEX	-.372	.821	-0.45	.65	-1.983	1.239	
logFTE	-4.117	1.184	-3.48	.001	-6.44	-1.794	***
FIRM_AGE	.006	.002	2.55	.011	.001	.01	**
ESG_STRA	9.019	1.513	5.96	0	6.052	11.987	***
logRD* lag3MERGER_STR	-.471	.233	-2.02	.044	-.929	-.013	**
logRD* DEMERGER_STR	-.457	.252	-1.82	.069	-.951	.036	*
logFTE* lag3MERGER_STR	-.384	.761	-0.51	.614	-1.877	1.108	
logFTE* DEMERGER_STR	.365	.901	0.40	.686	-1.403	2.132	
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	13.158	8.289	1.59	.113	-3.099	29.416	

Mean dependent var	55.997	SD dependent var	21.763
R-squared	0.325	Number of obs	1732
F-test	35.139	Prob > F	0.000
Akaike crit. (AIC)	15042.370	Bayesian crit. (BIC)	15418.905

**** p<.01, ** p<.05, * p<.1*

Appendix 29

Table A48 First-leg Regression of MODEL 2.A.1

Outcome model : weighted least squares
Treatment model: inverse probability tilting
Number of obs = 2,790

Treatment starting-time_D		Coefficient	Std. err.	z	P>z	[95%	conf. interval]
g2011							
	t_2010_2011	9.528	12.031	0.790	0.428	-14.052	33.108
	t_2010_2012	5.290	12.149	0.440	0.663	-18.521	29.102
	t_2010_2013	2.263	9.549	0.240	0.813	-16.452	20.978
	t_2010_2014	4.656	9.231	0.500	0.614	-13.437	22.750
	t_2010_2015	2.092	9.806	0.210	0.831	-17.127	21.312
	t_2010_2016	3.583	10.396	0.340	0.730	-16.793	23.958
	t_2010_2017	-12.821	3.560	-3.600	0.000	-19.798	-5.844
	t_2010_2018	-14.530	3.822	-3.800	0.000	-22.021	-7.038
	t_2010_2019	-6.603	4.022	-1.640	0.101	-14.487	1.280
g2012							
	t_2010_2011	-29.032	19.362	-1.500	0.134	-66.981	8.917
	t_2011_2012	-1.443	6.473	-0.220	0.824	-14.129	11.244
	t_2011_2013	4.878	9.692	0.500	0.615	-14.119	23.874
	t_2011_2014	11.051	6.579	1.680	0.093	-1.844	23.945
	t_2011_2015	11.762	8.097	1.450	0.146	-4.107	27.631
	t_2011_2016	0.952	7.290	0.130	0.896	-13.335	15.240
	t_2011_2017	2.666	7.547	0.350	0.724	-12.126	17.459
	t_2011_2018	1.015	7.577	0.130	0.893	-13.835	15.865
	t_2011_2019	12.671	8.646	1.470	0.143	-4.275	29.618
g2013	g2013						
	t_2010_2011	-3.062	2.277	-1.350	0.179	-7.524	1.400
	t_2011_2012	-0.963	2.307	-0.420	0.676	-5.485	3.560
	t_2012_2013	0.753	1.003	0.750	0.453	-1.213	2.719

	t_2012_2014	14.926	25.081	0.600	0.552	-34.231	64.083
	t_2012_2015	13.037	24.348	0.540	0.592	-34.684	60.759
	t_2012_2016	13.773	25.224	0.550	0.585	-35.666	63.211
	t_2012_2017	10.689	23.792	0.450	0.653	-35.943	57.321
	t_2012_2018	13.935	23.598	0.590	0.555	-32.315	60.186
	t_2012_2019	11.572	24.431	0.470	0.636	-36.313	59.456
g2014							
	t_2010_2011	-4.160	2.257	-1.840	0.065	-8.584	0.265
	t_2011_2012	-2.575	1.823	-1.410	0.158	-6.149	0.998
	t_2012_2013	-0.494	0.467	-1.060	0.290	-1.410	0.422
	t_2013_2014	13.348	10.904	1.220	0.221	-8.023	34.719
	t_2013_2015	10.354	11.018	0.940	0.347	-11.241	31.949
	t_2013_2016	10.462	11.688	0.900	0.371	-12.446	33.370
	t_2013_2017	7.933	11.370	0.700	0.485	-14.351	30.217
	t_2013_2018	4.240	13.717	0.310	0.757	-22.645	31.124
	t_2013_2019	9.721	14.302	0.680	0.497	-18.310	37.752
g2015							
	t_2010_2011	-5.894	4.268	-1.380	0.167	-14.259	2.471
	t_2011_2012	-7.853	4.036	-1.950	0.052	-15.763	0.058
	t_2012_2013	-0.833	0.667	-1.250	0.212	-2.140	0.475
	t_2013_2014	5.633	3.406	1.650	0.098	-1.043	12.309
	t_2014_2015	1.757	3.948	0.440	0.656	-5.981	9.495
	t_2014_2016	6.491	4.715	1.380	0.169	-2.750	15.732
	t_2014_2017	4.043	5.342	0.760	0.449	-6.428	14.514
	t_2014_2018	6.359	5.664	1.120	0.262	-4.742	17.461
	t_2014_2019	5.120	5.843	0.880	0.381	-6.332	16.572
g2016							
	t_2010_2011	-2.684	4.562	-0.590	0.556	-11.625	6.257
	t_2011_2012	0.148	5.983	0.020	0.980	-11.579	11.876

	t_2012_2013	-1.547	2.399	-0.640	0.519	-6.250	3.155
	t_2013_2014	3.813	2.202	1.730	0.083	-0.504	8.130
	t_2014_2015	1.096	5.910	0.190	0.853	-10.487	12.679
	t_2015_2016	0.845	1.959	0.430	0.666	-2.994	4.684
	t_2015_2017	-0.632	2.490	-0.250	0.800	-5.513	4.249
	t_2015_2018	-0.377	2.929	-0.130	0.898	-6.116	5.363
	t_2015_2019	4.188	4.709	0.890	0.374	-5.041	13.416
g2017							
	t_2010_2011	-1.925	9.678	-0.200	0.842	-20.894	17.044
	t_2011_2012	-1.891	8.484	-0.220	0.824	-18.520	14.738
	t_2012_2013	2.772	3.646	0.760	0.447	-4.375	9.918
	t_2013_2014	5.053	4.704	1.070	0.283	-4.166	14.272
	t_2014_2015	-1.568	3.539	-0.440	0.658	-8.504	5.368
	t_2015_2016	-1.816	4.145	-0.440	0.661	-9.939	6.308
	t_2016_2017	-2.346	1.448	-1.620	0.105	-5.183	0.491
	t_2016_2018	10.761	6.857	1.570	0.117	-2.679	24.201
	t_2016_2019	8.766	7.290	1.200	0.229	-5.522	23.053
g2018							
	t_2010_2011	5.730	4.283	1.340	0.181	-2.665	14.125
	t_2011_2012	-2.221	4.646	-0.480	0.633	-11.328	6.886
	t_2012_2013	-0.105	0.706	-0.150	0.882	-1.489	1.279
	t_2013_2014	0.865	2.993	0.290	0.773	-5.002	6.732
	t_2014_2015	-5.880	2.784	-2.110	0.035	-11.336	-0.423
	t_2015_2016	1.952	3.157	0.620	0.536	-4.237	8.140
	t_2016_2017	-1.886	2.311	-0.820	0.414	-6.415	2.642
	t_2017_2018	0.595	1.343	0.440	0.658	-2.037	3.228
	t_2017_2019	1.778	2.186	0.810	0.416	-2.506	6.061
g2019							
	t_2010_2011	2.201	3.653	0.600	0.547	-4.958	9.360

	t_2011_2012	-1.291	2.399	-0.540	0.591	-5.993	3.412
	t_2012_2013	-0.761	0.605	-1.260	0.208	-1.946	0.424
	t_2013_2014	1.720	1.859	0.920	0.355	-1.925	5.364
	t_2014_2015	-2.587	2.097	-1.230	0.217	-6.697	1.522
	t_2015_2016	2.635	2.835	0.930	0.353	-2.922	8.193
	t_2016_2017	-0.478	2.087	-0.230	0.819	-4.569	3.613
	t_2017_2018	0.784	1.598	0.490	0.624	-2.349	3.917
	t_2018_2019	1.004	1.782	0.560	0.573	-2.489	4.497
g2020							
	t_2010_2011	-3.600	3.010	-1.200	0.232	-9.500	2.299
	t_2011_2012	0.204	2.637	0.080	0.938	-4.964	5.372
	t_2012_2013	-0.269	0.924	-0.290	0.771	-2.080	1.542
	t_2013_2014	-1.366	2.116	-0.650	0.518	-5.513	2.781
	t_2014_2015	-0.353	2.245	-0.160	0.875	-4.753	4.047
	t_2015_2016	1.396	1.994	0.700	0.484	-2.513	5.305
	t_2016_2017	-2.423	2.018	-1.200	0.230	-6.378	1.532
	t_2017_2018	3.560	1.810	1.970	0.049	0.013	7.107
	t_2018_2019	0.865	1.682	0.510	0.607	-2.431	4.160

Control: Never Treated
See Callaway and Sant'Anna (2021) for details

Appendix 30

Table A49 ATT MODEL 2.A.1

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.413	0.576	-0.720	0.473	-1.541	0.715
Post_avg	2.886	3.396	0.850	0.395	-3.769	9.542
Tm9	-3.600	3.010	-1.200	0.232	-9.500	2.299
Tm8	0.929	2.084	0.450	0.656	-3.155	5.013
Tm7	0.518	1.149	0.450	0.652	-1.733	2.770
Tm6	-1.381	1.428	-0.970	0.333	-4.180	1.418
Tm5	-0.064	1.245	-0.050	0.959	-2.503	2.376
Tm4	-0.163	1.072	-0.150	0.879	-2.265	1.939
Tm3	-1.671	1.214	-1.380	0.169	-4.051	0.709
Tm2	1.647	1.016	1.620	0.105	-0.345	3.638
Tm1	0.070	1.100	0.060	0.949	-2.086	2.227
Tp0	1.099	1.012	1.090	0.278	-0.885	3.082
Tp1	4.425	2.053	2.150	0.031	0.400	8.450
Tp2	5.127	3.106	1.650	0.099	-0.961	11.214
Tp3	6.520	3.673	1.780	0.076	-0.679	13.719
Tp4	4.560	4.827	0.940	0.345	-4.900	14.021
Tp5	7.049	7.378	0.960	0.339	-7.411	21.509
Tp6	0.195	8.215	0.020	0.981	-15.905	16.295
Tp7	3.604	8.179	0.440	0.659	-12.426	19.635
Tp8	-6.603	4.022	-1.640	0.101	-14.487	1.280

Pretrend Test. H0 All Pre-treatment are equal to 0

chi2(45) = 69.8883

p-value = 0.0101

Table A50 ATT MODEL 2.B.1

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.197	0.355	0.550	0.579	-0.499	0.892
Post_avg	1.789	1.688	1.060	0.289	-1.519	5.096
Tm9	0.508	2.023	0.250	0.802	-3.456	4.473
Tm8	-0.105	1.037	-0.100	0.919	-2.137	1.927
Tm7	-0.305	0.671	-0.460	0.649	-1.620	1.009
Tm6	0.207	0.578	0.360	0.721	-0.926	1.339
Tm5	0.011	0.609	0.020	0.986	-1.182	1.204
Tm4	0.584	0.508	1.150	0.250	-0.412	1.580
Tm3	0.651	0.496	1.310	0.189	-0.321	1.624
Tm2	0.911	0.465	1.960	0.050	0.001	1.822
Tm1	-0.692	0.471	-1.470	0.141	-1.614	0.230
Tp0	0.917	0.592	1.550	0.121	-0.243	2.077
Tp1	2.328	0.918	2.540	0.011	0.529	4.127
Tp2	3.186	1.321	2.410	0.016	0.597	5.776
Tp3	3.125	1.548	2.020	0.043	0.091	6.159
Tp4	2.425	2.084	1.160	0.245	-1.660	6.510
Tp5	4.220	2.803	1.510	0.132	-1.273	9.713
Tp6	2.561	3.019	0.850	0.396	-3.356	8.478
Tp7	-1.351	3.897	-0.350	0.729	-8.990	6.288
Tp8	-1.314	5.074	-0.260	0.796	-11.260	8.632

Pretrend Test. H0 All Pre-treatment are equal to 0

chi2(45) = 69.8883

p-value = 0.0101

Table A51 ATT MODEL 2.C.1

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.075	0.351	0.210	0.830	-0.612	0.763
Post_avg	-0.575	1.990	-0.290	0.773	-4.474	3.325
Tm9	-1.274	1.392	-0.920	0.360	-4.002	1.454
Tm8	-0.328	1.085	-0.300	0.762	-2.454	1.798
Tm7	0.245	0.732	0.330	0.738	-1.190	1.679
Tm6	-0.381	0.750	-0.510	0.611	-1.850	1.089
Tm5	0.704	0.760	0.930	0.354	-0.785	2.193
Tm4	-0.055	0.589	-0.090	0.926	-1.210	1.100
Tm3	0.275	0.608	0.450	0.651	-0.916	1.467
Tm2	1.746	0.544	3.210	0.001	0.680	2.812
Tm1	-0.253	0.611	-0.410	0.679	-1.450	0.944
Tp0	0.884	0.639	1.380	0.166	-0.368	2.136
Tp1	2.267	1.168	1.940	0.052	-0.022	4.555
Tp2	2.618	1.630	1.610	0.108	-0.576	5.813
Tp3	2.700	1.891	1.430	0.153	-1.007	6.407
Tp4	-0.580	2.310	-0.250	0.802	-5.107	3.947
Tp5	-0.195	3.080	-0.060	0.950	-6.232	5.842
Tp6	-2.805	3.213	-0.870	0.383	-9.102	3.491
Tp7	-2.423	4.207	-0.580	0.565	-10.668	5.821
Tp8	-7.638	4.735	-1.610	0.107	-16.917	1.642

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(45) = 166.8640
p-value = 0.0000

Table A52 ATT MODEL 2.D.1

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.081	0.330	0.250	0.806	-0.566	0.729
Post_avg	0.589	2.352	0.250	0.802	-4.021	5.200
Tm9	0.521	1.444	0.360	0.718	-2.309	3.352
Tm8	-0.570	0.943	-0.600	0.546	-2.419	1.279
Tm7	0.407	0.769	0.530	0.597	-1.100	1.915
Tm6	0.802	0.808	0.990	0.321	-0.781	2.385
Tm5	-0.669	0.756	-0.880	0.377	-2.151	0.813
Tm4	0.563	0.685	0.820	0.411	-0.780	1.905
Tm3	-0.228	0.657	-0.350	0.728	-1.516	1.059
Tm2	0.667	0.644	1.040	0.300	-0.594	1.929
Tm1	-0.762	0.631	-1.210	0.227	-1.998	0.475
Tp0	1.119	0.812	1.380	0.168	-0.472	2.710
Tp1	1.852	1.297	1.430	0.153	-0.691	4.395
Tp2	1.847	1.764	1.050	0.295	-1.611	5.304
Tp3	4.025	2.213	1.820	0.069	-0.312	8.362
Tp4	1.826	2.474	0.740	0.460	-3.022	6.674
Tp5	-0.046	4.697	-0.010	0.992	-9.252	9.161
Tp6	-2.628	5.611	-0.470	0.640	-13.625	8.369
Tp7	-0.733	6.298	-0.120	0.907	-13.078	11.611
Tp8	-1.957	6.082	-0.320	0.748	-13.876	9.963

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(45) = 132.6974
p-value = 0.0000

Table A53 ATT MODEL 2.E.1

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.221	0.435	-0.510	0.611	-1.073	0.631
Post_avg	2.916	2.472	1.180	0.238	-1.929	7.761
Tm9	-1.996	2.435	-0.820	0.412	-6.769	2.776
Tm8	-1.294	1.542	-0.840	0.402	-4.317	1.730
Tm7	-0.615	1.155	-0.530	0.594	-2.879	1.649
Tm6	0.069	1.151	0.060	0.952	-2.186	2.324
Tm5	-0.256	1.069	-0.240	0.811	-2.351	1.840
Tm4	1.429	0.945	1.510	0.130	-0.422	3.280
Tm3	1.992	0.947	2.100	0.035	0.136	3.849
Tm2	0.063	0.904	0.070	0.944	-1.708	1.835
Tm1	-1.381	0.967	-1.430	0.153	-3.278	0.515
Tp0	0.579	1.208	0.480	0.632	-1.789	2.948
Tp1	2.596	1.758	1.480	0.140	-0.849	6.042
Tp2	4.677	2.444	1.910	0.056	-0.113	9.467
Tp3	2.115	2.738	0.770	0.440	-3.251	7.480
Tp4	5.195	4.223	1.230	0.219	-3.082	13.473
Tp5	11.025	4.604	2.390	0.017	2.002	20.049
Tp6	10.303	8.546	1.210	0.228	-6.448	27.054
Tp7	-4.647	5.839	-0.800	0.426	-16.092	6.798
Tp8	-5.599	2.608	-2.150	0.032	-10.709	-0.488

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(45) = 97.0151
p-value = 0.0000

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Table A54 ATT MODEL 2.A.2

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.957	1.136	-0.840	0.399	-3.183	1.269
Post_avg	-1.085	3.022	-0.360	0.720	-7.009	4.839
Tm8	7.077	5.140	1.380	0.169	-2.999	17.152
Tm7	-0.268	5.255	-0.050	0.959	-10.567	10.032
Tm6	1.884	3.091	0.610	0.542	-4.173	7.941
Tm5	-10.505	3.423	-3.070	0.002	-17.213	-3.796
Tm4	1.575	3.416	0.460	0.645	-5.119	8.270
Tm3	-4.852	1.943	-2.500	0.013	-8.661	-1.044
Tm2	-0.396	1.298	-0.310	0.760	-2.941	2.149
Tm1	-2.170	2.072	-1.050	0.295	-6.230	1.890
Tp0	-0.948	1.586	-0.600	0.550	-4.056	2.161
Tp1	-3.159	2.187	-1.440	0.149	-7.446	1.128
Tp2	-2.572	2.539	-1.010	0.311	-7.548	2.405
Tp3	-2.748	2.886	-0.950	0.341	-8.405	2.909
Tp4	-3.442	3.306	-1.040	0.298	-9.923	3.038
Tp5	-1.086	4.094	-0.270	0.791	-9.110	6.939
Tp6	0.923	4.497	0.210	0.837	-7.890	9.736
Tp7	2.684	5.411	0.500	0.620	-7.922	13.290
Tp8	0.580	5.336	0.110	0.913	-9.878	11.038

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(29) = 615.3237
p-value = 0.0000

Table A55 ATT MODEL 2.B.2

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.883	0.730	-1.210	0.226	-2.313	0.548
Post_avg	-1.428	1.434	-1.000	0.319	-4.237	1.382
Tm8	-5.702	3.440	-1.660	0.097	-12.445	1.041
Tm7	1.640	1.341	1.220	0.221	-0.989	4.270
Tm6	-0.785	2.754	-0.280	0.776	-6.182	4.612
Tm5	-2.691	1.778	-1.510	0.130	-6.176	0.794
Tm4	-0.562	1.597	-0.350	0.725	-3.691	2.567
Tm3	1.623	0.999	1.620	0.104	-0.335	3.581
Tm2	-0.532	1.137	-0.470	0.640	-2.760	1.696
Tm1	-0.054	0.935	-0.060	0.954	-1.887	1.779
Tp0	-0.616	0.844	-0.730	0.466	-2.270	1.038
Tp1	-0.743	0.982	-0.760	0.449	-2.669	1.182
Tp2	-0.624	1.116	-0.560	0.576	-2.812	1.563
Tp3	-0.773	1.377	-0.560	0.575	-3.472	1.926
Tp4	-0.308	1.544	-0.200	0.842	-3.335	2.719
Tp5	-2.590	1.848	-1.400	0.161	-6.211	1.032
Tp6	-2.591	1.997	-1.300	0.194	-6.504	1.322
Tp7	-2.024	2.339	-0.870	0.387	-6.609	2.560
Tp8	-2.579	2.907	-0.890	0.375	-8.276	3.118

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(29) = 38.2446
p-value = 0.1170

Table A56 ATT MODEL 2.C.2

	Coefficient	Std.	Z	P>z	[95%	conf.
Pre_avg	-0.081	0.642	-0.130	0.900	-1.338	1.177
Post_avg	-1.993	1.642	-1.210	0.225	-5.211	1.226
Tm8	6.108	2.289	2.670	0.008	1.622	10.594
Tm7	-0.410	3.798	-0.110	0.914	-7.854	7.033
Tm6	0.179	1.451	0.120	0.902	-2.665	3.024
Tm5	-4.635	1.992	-2.330	0.020	-8.539	-0.732
Tm4	-1.244	2.251	-0.550	0.580	-5.656	3.168
Tm3	-0.948	1.096	-0.860	0.387	-3.096	1.201
Tm2	-0.350	0.988	-0.350	0.723	-2.285	1.586
Tm1	0.655	0.866	0.760	0.449	-1.041	2.352
Tp0	-0.093	0.764	-0.120	0.903	-1.591	1.405
Tp1	-1.690	1.134	-1.490	0.136	-3.912	0.533
Tp2	-1.923	1.336	-1.440	0.150	-4.540	0.695
Tp3	-1.624	1.558	-1.040	0.297	-4.677	1.430
Tp4	-1.153	1.930	-0.600	0.550	-4.937	2.630
Tp5	-2.553	2.261	-1.130	0.259	-6.984	1.878
Tp6	-3.181	2.359	-1.350	0.177	-7.805	1.442
Tp7	-3.330	2.754	-1.210	0.227	-8.727	2.067
Tp8	-2.388	3.179	-0.750	0.453	-8.618	3.843
Pretrend Test. H0 All Pre-treatment are equal to 0						
chi2(29) = 89.3842						
p-value = 0.0000						

Table A57 ATT MODEL 2.D.2

	Coefficient	Std.	Z	P>z	[95%	conf.
Pre_avg	-0.505	0.515	-0.980	0.326	-1.514	0.504
Post_avg	0.593	1.773	0.330	0.738	-2.881	4.067
Tm8	-2.567	2.089	-1.230	0.219	-6.661	1.528
Tm7	-1.362	1.694	-0.800	0.421	-4.682	1.958
Tm6	0.185	1.236	0.150	0.881	-2.238	2.607
Tm5	1.176	1.510	0.780	0.436	-1.784	4.136
Tm4	-1.194	1.175	-1.020	0.310	-3.496	1.108
Tm3	1.872	1.241	1.510	0.131	-0.560	4.305
Tm2	-0.248	1.070	-0.230	0.817	-2.346	1.850
Tm1	-1.905	1.053	-1.810	0.070	-3.969	0.158
Tp0	-0.478	0.811	-0.590	0.556	-2.068	1.112
Tp1	0.141	1.278	0.110	0.912	-2.363	2.646
Tp2	1.012	1.536	0.660	0.510	-1.999	4.023
Tp3	2.151	1.737	1.240	0.216	-1.254	5.556
Tp4	1.969	1.965	1.000	0.316	-1.882	5.820
Tp5	-0.296	2.240	-0.130	0.895	-4.687	4.094
Tp6	0.028	2.540	0.010	0.991	-4.950	5.006
Tp7	0.260	3.238	0.080	0.936	-6.087	6.607
Tp8	0.552	3.776	0.150	0.884	-6.848	7.953
Pretrend Test. H0 All Pre-treatment are equal to 0						
chi2(29) = 288.0337						
p-value = 0.0000						

Table A58 ATT MODEL 2.E.2

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.050	1.024	-0.050	0.961	-2.058	1.958
Post_avg	-1.471	1.907	-0.770	0.440	-5.208	2.266
Tm8	-9.090	5.648	-1.610	0.108	-20.160	1.980
Tm7	6.694	4.243	1.580	0.115	-1.623	15.011
Tm6	1.802	3.061	0.590	0.556	-4.198	7.802
Tm5	-1.045	2.137	-0.490	0.625	-5.234	3.143
Tm4	0.003	2.448	0.000	0.999	-4.795	4.800
Tm3	2.968	2.128	1.390	0.163	-1.204	7.139
Tm2	-1.664	1.665	-1.000	0.318	-4.927	1.599
Tm1	-0.068	1.603	-0.040	0.966	-3.211	3.075
Tp0	-0.435	1.327	-0.330	0.743	-3.036	2.166
Tp1	0.260	1.530	0.170	0.865	-2.740	3.259
Tp2	-0.021	1.835	-0.010	0.991	-3.617	3.574
Tp3	-1.794	2.106	-0.850	0.394	-5.923	2.334
Tp4	-0.598	2.438	-0.250	0.806	-5.377	4.181
Tp5	-3.517	2.707	-1.300	0.194	-8.823	1.788
Tp6	-3.082	2.886	-1.070	0.286	-8.740	2.575
Tp7	-1.003	3.434	-0.290	0.770	-7.733	5.727
Tp8	-3.046	4.157	-0.730	0.464	-11.194	5.102
Pretrend Test. H0 All Pre-treatment are equal to 0						
chi2(29) = 49.8543						
p-value = 0.0094						

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Table A59 ATT MODEL 2.A.3

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-1.548	0.890	-1.740	0.082	-3.293	0.196
Post_avg	1.076	3.093	0.350	0.728	-4.985	7.138
Tm8	-3.328	3.024	-1.100	0.271	-9.255	2.600
Tm7	-7.039	2.371	-2.970	0.003	-11.687	-2.391
Tm6	-0.545	2.855	-0.190	0.849	-6.141	5.051
Tm5	-2.518	1.656	-1.520	0.128	-5.765	0.728
Tm4	1.629	1.829	0.890	0.373	-1.955	5.213
Tm3	-2.345	1.266	-1.850	0.064	-4.826	0.136
Tm2	0.585	1.498	0.390	0.696	-2.350	3.521
Tm1	1.173	1.454	0.810	0.420	-1.677	4.023
Tp0	3.164	1.415	2.240	0.025	0.389	5.938
Tp1	3.417	2.010	1.700	0.089	-0.523	7.356
Tp2	1.772	2.363	0.750	0.453	-2.860	6.404
Tp3	-0.126	2.666	-0.050	0.962	-5.352	5.100
Tp4	1.497	3.223	0.460	0.642	-4.819	7.813
Tp5	1.020	3.902	0.260	0.794	-6.629	8.668
Tp6	-0.879	4.754	-0.180	0.853	-10.196	8.439
Tp7	-1.174	5.105	-0.230	0.818	-11.179	8.831
Tp8	0.995	6.297	0.160	0.874	-11.347	13.338
		Pretrend Test. H0 All Pre-treatment are equal to 0				
			chi2(36) =	80.8662		
			p-value =	0.0000		

Table A60 ATT MODEL 2.B.3

	Coefficient	Std.	err.	z	P>z	[95%
Pre_avg	0.311	0.692	0.450	0.653	-1.046	1.667
Post_avg	0.700	1.420	0.490	0.622	-2.084	3.484
Tm8	0.748	3.630	0.210	0.837	-6.367	7.863
Tm7	1.081	1.585	0.680	0.495	-2.025	4.186
Tm6	-0.363	1.038	-0.350	0.727	-2.398	1.672
Tm5	0.604	0.915	0.660	0.509	-1.190	2.398
Tm4	-1.260	0.837	-1.510	0.132	-2.902	0.381
Tm3	0.333	0.747	0.450	0.656	-1.131	1.796
Tm2	0.614	0.560	1.100	0.273	-0.483	1.711
Tm1	0.732	0.614	1.190	0.234	-0.473	1.936
Tp0	-0.151	0.647	-0.230	0.816	-1.418	1.117
Tp1	0.794	0.809	0.980	0.327	-0.792	2.380
Tp2	1.251	1.048	1.190	0.233	-0.804	3.306
Tp3	0.409	1.265	0.320	0.746	-2.070	2.888
Tp4	0.438	1.485	0.290	0.768	-2.473	3.348
Tp5	-0.031	1.780	-0.020	0.986	-3.520	3.458
Tp6	0.718	2.095	0.340	0.732	-3.388	4.825
Tp7	0.858	2.371	0.360	0.717	-3.789	5.506
Tp8	2.014	3.088	0.650	0.514	-4.038	8.067
		Pretrend Test. H0 All Pre-treatment are equal to 0				
			chi2(36) =	45.9257		
			p-value =	0.1243		

Table A61 ATT MODEL 2.C.3

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.564	0.497	-1.140	0.256	-1.537	0.410
Post_avg	0.992	1.837	0.540	0.589	-2.609	4.593
Tm8	-1.347	1.519	-0.890	0.375	-4.324	1.631
Tm7	-3.014	1.183	-2.550	0.011	-5.334	-0.695
Tm6	-0.730	1.470	-0.500	0.619	-3.610	2.150
Tm5	-1.349	0.907	-1.490	0.137	-3.126	0.428
Tm4	1.008	0.929	1.090	0.278	-0.813	2.830
Tm3	-1.300	0.731	-1.780	0.075	-2.732	0.132
Tm2	0.932	0.749	1.240	0.213	-0.536	2.400
Tm1	1.291	0.824	1.570	0.117	-0.323	2.905
Tp0	0.917	0.705	1.300	0.193	-0.465	2.300
Tp1	1.804	1.095	1.650	0.099	-0.342	3.950
Tp2	1.881	1.375	1.370	0.171	-0.813	4.575
Tp3	0.922	1.633	0.560	0.572	-2.279	4.124
Tp4	1.589	1.978	0.800	0.422	-2.289	5.467
Tp5	0.717	2.250	0.320	0.750	-3.692	5.126
Tp6	-0.788	2.652	-0.300	0.766	-5.985	4.409
Tp7	-0.065	2.946	-0.020	0.982	-5.840	5.710
Tp8	1.951	3.761	0.520	0.604	-5.421	9.322
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 53.4282				
		p-value = 0.0308				

Table A62 ATT MODEL 2.D.3

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.095	0.559	0.170	0.865	-1.001	1.191
Post_avg	0.191	1.758	0.110	0.913	-3.255	3.638
Tm8	1.367	2.622	0.520	0.602	-3.773	6.507
Tm7	1.154	1.669	0.690	0.489	-2.118	4.425
Tm6	0.345	1.019	0.340	0.735	-1.652	2.342
Tm5	-1.141	0.996	-1.150	0.252	-3.092	0.811
Tm4	-1.986	0.727	-2.730	0.006	-3.410	-0.561
Tm3	1.020	0.886	1.150	0.250	-0.717	2.756
Tm2	0.279	0.709	0.390	0.694	-1.111	1.668
Tm1	-0.275	0.645	-0.430	0.670	-1.538	0.989
Tp0	0.603	0.677	0.890	0.373	-0.723	1.929
Tp1	0.406	1.000	0.410	0.685	-1.553	2.365
Tp2	0.718	1.281	0.560	0.575	-1.792	3.227
Tp3	0.116	1.621	0.070	0.943	-3.063	3.294
Tp4	-0.963	1.916	-0.500	0.615	-4.718	2.791
Tp5	-1.636	2.358	-0.690	0.488	-6.257	2.985
Tp6	-0.361	2.689	-0.130	0.893	-5.631	4.910
Tp7	0.386	3.051	0.130	0.899	-5.594	6.366
Tp8	2.455	3.896	0.630	0.529	-5.181	10.090
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 86.2111				
		p-value = 0.0000				

Table A63 ATT MODEL 2.E.3

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.003	0.803	0.000	0.997	-1.571	1.576
Post_avg	0.147	1.929	0.080	0.939	-3.633	3.927
Tm8	-0.722	3.926	-0.180	0.854	-8.416	6.973
Tm7	1.254	2.436	0.520	0.607	-3.519	6.028
Tm6	-1.352	1.563	-0.860	0.387	-4.416	1.712
Tm5	1.249	1.195	1.050	0.296	-1.093	3.591
Tm4	-2.055	1.300	-1.580	0.114	-4.603	0.493
Tm3	0.826	1.341	0.620	0.538	-1.804	3.455
Tm2	-0.012	1.165	-0.010	0.992	-2.294	2.271
Tm1	0.832	1.063	0.780	0.434	-1.251	2.914
Tp0	-2.345	0.926	-2.530	0.011	-4.160	-0.530
Tp1	-0.241	1.295	-0.190	0.852	-2.779	2.296
Tp2	0.686	1.625	0.420	0.673	-2.499	3.871
Tp3	-0.338	1.930	-0.180	0.861	-4.122	3.445
Tp4	0.088	2.343	0.040	0.970	-4.505	4.681
Tp5	0.079	2.618	0.030	0.976	-5.053	5.211
Tp6	2.366	3.077	0.770	0.442	-3.665	8.397
Tp7	1.187	3.334	0.360	0.722	-5.347	7.722
Tp8	-0.159	4.423	-0.040	0.971	-8.828	8.510
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 45.6610				
		p-value = 0.1298				

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Table A64 ATT MODEL 2.A.4

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.655	1.025	-0.640	0.523	-2.664	1.354
Post_avg	-2.202	2.540	-0.870	0.386	-7.181	2.777
Tm8	-0.584	2.757	-0.210	0.832	-5.987	4.820
Tm7	7.892	5.023	1.570	0.116	-1.953	17.736
Tm6	-2.326	2.524	-0.920	0.357	-7.274	2.621
Tm5	-3.206	2.127	-1.510	0.132	-7.376	0.964
Tm4	-3.094	1.786	-1.730	0.083	-6.595	0.408
Tm3	-1.801	1.421	-1.270	0.205	-4.586	0.983
Tm2	-1.286	1.386	-0.930	0.353	-4.002	1.430
Tm1	-0.833	1.299	-0.640	0.521	-3.379	1.712
Tp0	-1.468	0.934	-1.570	0.116	-3.299	0.362
Tp1	-4.174	1.347	-3.100	0.002	-6.814	-1.535
Tp2	-2.811	2.003	-1.400	0.160	-6.738	1.115
Tp3	-1.628	2.363	-0.690	0.491	-6.260	3.004
Tp4	-2.289	2.898	-0.790	0.430	-7.968	3.390
Tp5	0.749	3.432	0.220	0.827	-5.977	7.475
Tp6	-1.044	4.088	-0.260	0.798	-9.057	6.969
Tp7	-2.810	4.695	-0.600	0.549	-12.011	6.391
Tp8	-4.342	4.960	-0.880	0.381	-14.063	5.379
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 55.7054				
		p-value = 0.0191				

Table A65 ATT MODEL 2.B.4

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.911	0.653	-1.400	0.163	-2.192	0.369
Post_avg	-0.882	1.231	-0.720	0.474	-3.295	1.532
Tm8	-5.750	3.204	-1.790	0.073	-12.030	0.531
Tm7	0.911	1.962	0.460	0.642	-2.934	4.757
Tm6	-1.530	1.236	-1.240	0.216	-3.952	0.893
Tm5	-0.899	0.925	-0.970	0.331	-2.712	0.914
Tm4	0.247	0.916	0.270	0.787	-1.547	2.041
Tm3	0.502	0.681	0.740	0.461	-0.834	1.837
Tm2	-0.796	0.626	-1.270	0.203	-2.023	0.431
Tm1	0.024	0.594	0.040	0.968	-1.140	1.187
Tp0	-0.882	0.530	-1.660	0.096	-1.921	0.158
Tp1	-0.231	0.671	-0.340	0.730	-1.547	1.084
Tp2	-0.873	0.947	-0.920	0.357	-2.730	0.983
Tp3	-0.154	1.165	-0.130	0.895	-2.437	2.130
Tp4	-0.355	1.346	-0.260	0.792	-2.993	2.283
Tp5	-1.571	1.640	-0.960	0.338	-4.786	1.643
Tp6	-1.973	1.872	-1.050	0.292	-5.642	1.695
Tp7	-1.731	2.191	-0.790	0.429	-6.026	2.563
Tp8	-0.163	2.603	-0.060	0.950	-5.265	4.939
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 52.6605				
		p-value = 0.0360				

Table A66 ATT MODEL 2.C.4

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.142	0.558	-0.250	0.799	-1.237	0.952
Post_avg	-2.503	1.463	-1.710	0.087	-5.370	0.363
Tm8	1.343	1.898	0.710	0.479	-2.378	5.064
Tm7	3.313	2.829	1.170	0.242	-2.232	8.858
Tm6	-2.563	1.280	-2.000	0.045	-5.072	-0.053
Tm5	-1.929	0.891	-2.170	0.030	-3.674	-0.183
Tm4	-1.638	0.988	-1.660	0.097	-3.575	0.298
Tm3	0.023	0.703	0.030	0.973	-1.354	1.401
Tm2	-0.270	0.807	-0.330	0.738	-1.852	1.313
Tm1	0.582	0.648	0.900	0.369	-0.689	1.853
Tp0	-0.455	0.548	-0.830	0.407	-1.530	0.620
Tp1	-1.388	0.843	-1.650	0.100	-3.041	0.264
Tp2	-2.326	1.131	-2.060	0.040	-4.542	-0.110
Tp3	-2.177	1.350	-1.610	0.107	-4.823	0.469
Tp4	-2.394	1.722	-1.390	0.164	-5.770	0.981
Tp5	-2.544	1.906	-1.340	0.182	-6.280	1.191
Tp6	-3.112	2.254	-1.380	0.167	-7.530	1.306
Tp7	-3.750	2.583	-1.450	0.146	-8.812	1.312
Tp8	-4.382	3.062	-1.430	0.152	-10.384	1.620

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(36) = 54.7419
p-value = 0.0234

Table A67 ATT MODEL 2.D.4

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.921	0.482	-1.910	0.056	-1.866	0.024
Post_avg	0.549	1.784	0.310	0.758	-2.947	4.045
Tm8	-0.760	2.260	-0.340	0.737	-5.190	3.671
Tm7	-2.010	1.167	-1.720	0.085	-4.297	0.278
Tm6	-0.932	0.847	-1.100	0.271	-2.591	0.728
Tm5	-0.226	0.810	-0.280	0.780	-1.812	1.361
Tm4	-0.005	0.788	-0.010	0.995	-1.549	1.538
Tm3	-0.847	0.713	-1.190	0.235	-2.245	0.551
Tm2	-1.038	0.754	-1.380	0.169	-2.515	0.440
Tm1	-1.552	0.711	-2.180	0.029	-2.944	-0.159
Tp0	-0.461	0.627	-0.730	0.463	-1.690	0.769
Tp1	0.832	0.989	0.840	0.400	-1.106	2.771
Tp2	0.705	1.223	0.580	0.564	-1.692	3.103
Tp3	1.489	1.597	0.930	0.351	-1.641	4.619
Tp4	0.541	1.848	0.290	0.770	-3.080	4.162
Tp5	0.139	2.234	0.060	0.950	-4.240	4.518
Tp6	0.134	2.824	0.050	0.962	-5.401	5.669
Tp7	0.055	3.376	0.020	0.987	-6.561	6.671
Tp8	1.506	4.188	0.360	0.719	-6.702	9.715

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(36) = 56.8461
p-value = 0.0149

Table A68 ATT MODEL 2.E.4

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-1.030	0.800	-1.290	0.198	-2.597	0.538
Post_avg	-0.617	1.782	-0.350	0.729	-4.110	2.876
Tm8	-10.816	4.705	-2.300	0.022	-20.037	-1.595
Tm7	0.661	2.499	0.260	0.791	-4.237	5.559
Tm6	0.190	1.431	0.130	0.894	-2.615	2.996
Tm5	-0.364	1.248	-0.290	0.771	-2.809	2.082
Tm4	-0.098	1.500	-0.070	0.948	-3.038	2.842
Tm3	1.895	1.348	1.410	0.160	-0.747	4.537
Tm2	-0.271	1.187	-0.230	0.820	-2.597	2.056
Tm1	0.565	1.090	0.520	0.604	-1.571	2.701
Tp0	-1.696	0.953	-1.780	0.075	-3.564	0.171
Tp1	-0.103	1.050	-0.100	0.922	-2.160	1.955
Tp2	-0.959	1.612	-0.590	0.552	-4.119	2.201
Tp3	0.274	1.919	0.140	0.886	-3.488	4.036
Tp4	0.844	2.129	0.400	0.692	-3.328	5.016
Tp5	-2.241	2.518	-0.890	0.373	-7.177	2.694
Tp6	-2.855	2.841	-1.010	0.315	-8.423	2.712
Tp7	-1.388	3.183	-0.440	0.663	-7.625	4.850
Tp8	2.573	3.889	0.660	0.508	-5.049	10.195
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(36) = 51.1577				
		p-value = 0.0485				

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Table A69 ATT MODEL 2.A.5

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.440	0.548	-0.800	0.422	-1.513	0.634
Post_avg	1.707	3.639	0.470	0.639	-5.426	8.840
Tm9	-2.208	3.296	-0.670	0.503	-8.667	4.251
Tm8	1.637	1.979	0.830	0.408	-2.241	5.515
Tm7	0.495	1.114	0.440	0.657	-1.689	2.679
Tm6	-2.243	1.466	-1.530	0.126	-5.117	0.630
Tm5	-0.031	1.185	-0.030	0.979	-2.353	2.291
Tm4	-0.504	1.018	-0.500	0.621	-2.498	1.491
Tm3	-1.635	1.136	-1.440	0.150	-3.861	0.591
Tm2	1.329	0.926	1.440	0.151	-0.486	3.144
Tm1	-0.796	1.148	-0.690	0.488	-3.047	1.454
Tp0	0.929	1.048	0.890	0.375	-1.125	2.983
Tp1	3.817	2.098	1.820	0.069	-0.296	7.930
Tp2	4.215	3.210	1.310	0.189	-2.076	10.505
Tp3	6.053	3.783	1.600	0.110	-1.363	13.468
Tp4	3.631	4.868	0.750	0.456	-5.909	13.172
Tp5	7.127	7.296	0.980	0.329	-7.173	21.427
Tp6	-0.853	8.109	-0.110	0.916	-16.746	15.040
Tp7	2.485	9.240	0.270	0.788	-15.626	20.596
Tp8	-12.042	4.781	-2.520	0.012	-21.412	-2.671

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(45) = 68.6221
p-value = 0.0132

Table A70 ATT MODEL 2.B.5

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.251	0.372	0.680	0.499	-0.478	0.981
Post_avg	1.351	1.623	0.830	0.405	-1.831	4.532
Tm9	-1.902	1.946	-0.980	0.328	-5.716	1.913
Tm8	0.659	1.122	0.590	0.557	-1.541	2.859
Tm7	0.166	0.755	0.220	0.826	-1.314	1.646
Tm6	-0.182	0.603	-0.300	0.763	-1.364	1.001
Tm5	-0.170	0.657	-0.260	0.796	-1.458	1.118
Tm4	1.446	0.724	2.000	0.046	0.026	2.865
Tm3	1.139	0.603	1.890	0.059	-0.043	2.321
Tm2	1.324	0.438	3.020	0.003	0.466	2.183
Tm1	-0.218	0.475	-0.460	0.646	-1.149	0.713
Tp0	1.054	0.606	1.740	0.082	-0.134	2.242
Tp1	2.082	0.926	2.250	0.025	0.267	3.898
Tp2	2.845	1.349	2.110	0.035	0.201	5.489
Tp3	2.604	1.554	1.680	0.094	-0.442	5.650
Tp4	1.771	2.101	0.840	0.399	-2.347	5.888
Tp5	3.539	2.880	1.230	0.219	-2.106	9.183
Tp6	2.110	2.982	0.710	0.479	-3.735	7.955
Tp7	-1.945	3.756	-0.520	0.605	-9.307	5.417
Tp8	-1.902	4.246	-0.450	0.654	-10.223	6.420

Pretrend Test. H0 All Pre-treatment are equal to 0
chi2(45) = 98.0565
p-value = 0.0000

Table A71 ATT MODEL 2.C.5

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.016	0.351	0.050	0.963	-0.671	0.703
Post_avg	-1.779	2.005	-0.890	0.375	-5.708	2.150
Tm9	-0.886	1.828	-0.480	0.628	-4.469	2.697
Tm8	0.169	1.010	0.170	0.867	-1.811	2.149
Tm7	0.180	0.721	0.250	0.803	-1.233	1.593
Tm6	-0.986	0.786	-1.260	0.209	-2.526	0.554
Tm5	0.543	0.686	0.790	0.429	-0.802	1.888
Tm4	0.621	0.654	0.950	0.342	-0.661	1.903
Tm3	0.012	0.736	0.020	0.987	-1.432	1.455
Tm2	1.226	0.577	2.120	0.034	0.094	2.358
Tm1	-0.731	0.623	-1.170	0.240	-1.951	0.489
Tp0	0.993	0.619	1.600	0.109	-0.220	2.206
Tp1	2.016	1.187	1.700	0.089	-0.310	4.341
Tp2	2.397	1.662	1.440	0.149	-0.859	5.654
Tp3	1.938	1.933	1.000	0.316	-1.850	5.726
Tp4	-1.438	2.341	-0.610	0.539	-6.027	3.150
Tp5	-1.722	3.055	-0.560	0.573	-7.709	4.265
Tp6	-4.248	3.298	-1.290	0.198	-10.712	2.216
Tp7	-4.680	4.360	-1.070	0.283	-13.225	3.866
Tp8	-11.264	4.333	-2.600	0.009	-19.758	-2.771
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(45) = 121.5348				
		p-value = 0.0000				

Table A72 ATT MODEL 2.D.5

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.038	0.369	0.100	0.918	-0.685	0.761
Post_avg	-0.129	2.311	-0.060	0.956	-4.657	4.400
Tm9	-1.331	1.816	-0.730	0.464	-4.890	2.228
Tm8	0.823	1.091	0.750	0.450	-1.314	2.961
Tm7	0.363	0.742	0.490	0.625	-1.091	1.816
Tm6	0.747	0.900	0.830	0.407	-1.017	2.510
Tm5	-0.894	0.733	-1.220	0.223	-2.331	0.543
Tm4	0.913	0.766	1.190	0.233	-0.588	2.415
Tm3	0.326	0.865	0.380	0.706	-1.369	2.022
Tm2	0.068	0.717	0.090	0.925	-1.337	1.473
Tm1	-0.672	0.628	-1.070	0.285	-1.904	0.560
Tp0	1.164	0.797	1.460	0.144	-0.399	2.726
Tp1	1.802	1.265	1.420	0.154	-0.677	4.282
Tp2	1.543	1.752	0.880	0.378	-1.891	4.977
Tp3	3.327	2.259	1.470	0.141	-1.099	7.754
Tp4	1.224	2.663	0.460	0.646	-3.996	6.443
Tp5	-0.952	4.799	-0.200	0.843	-10.357	8.453
Tp6	-3.719	5.455	-0.680	0.495	-14.410	6.972
Tp7	-2.036	6.041	-0.340	0.736	-13.876	9.805
Tp8	-3.511	5.296	-0.660	0.507	-13.891	6.869
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(45) = 159.0640				
		p-value = 0.0000				

Table A73 ATT MODEL 2.E.5

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	0.335	0.536	0.630	0.531	-0.715	1.385
Post_avg	2.421	2.435	0.990	0.320	-2.352	7.195
Tm9	-4.380	2.516	-1.740	0.082	-9.313	0.552
Tm8	-0.470	1.580	-0.300	0.766	-3.565	2.626
Tm7	0.548	1.375	0.400	0.690	-2.146	3.243
Tm6	-0.472	1.236	-0.380	0.703	-2.894	1.951
Tm5	-0.636	1.346	-0.470	0.636	-3.274	2.001
Tm4	2.567	1.447	1.770	0.076	-0.268	5.402
Tm3	3.059	1.358	2.250	0.024	0.397	5.721
Tm2	2.386	1.157	2.060	0.039	0.119	4.653
Tm1	0.414	1.446	0.290	0.775	-2.420	3.248
Tp0	0.758	1.289	0.590	0.556	-1.768	3.284
Tp1	2.040	1.831	1.110	0.265	-1.548	5.627
Tp2	3.990	2.593	1.540	0.124	-1.093	9.072
Tp3	1.768	2.685	0.660	0.510	-3.495	7.031
Tp4	4.315	4.130	1.040	0.296	-3.779	12.409
Tp5	10.565	4.656	2.270	0.023	1.440	19.690
Tp6	10.209	8.496	1.200	0.229	-6.442	26.861
Tp7	-4.572	5.672	-0.810	0.420	-15.688	6.545
Tp8	-7.282	2.769	-2.630	0.009	-12.710	-1.855
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(45) = 73.9863				
		p-value = 0.0042				

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Table A74 ATT MODEL 2.A.6

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-1.359	1.122	-1.210	0.226	-3.559	0.840
Post_avg	-1.251	3.013	-0.420	0.678	-7.157	4.654
Tm8	5.531	5.230	1.060	0.290	-4.720	15.782
Tm7	-1.774	5.367	-0.330	0.741	-12.293	8.746
Tm6	1.893	3.038	0.620	0.533	-4.062	7.847
Tm5	-10.131	3.529	-2.870	0.004	-17.047	-3.215
Tm4	0.833	3.409	0.240	0.807	-5.848	7.514
Tm3	-5.112	2.015	-2.540	0.011	-9.061	-1.163
Tm2	-0.168	1.354	-0.120	0.901	-2.822	2.487
Tm1	-1.947	2.087	-0.930	0.351	-6.037	2.143
Tp0	-1.109	1.577	-0.700	0.482	-4.200	1.983
Tp1	-3.272	2.306	-1.420	0.156	-7.793	1.248
Tp2	-2.596	2.619	-0.990	0.322	-7.730	2.537
Tp3	-2.816	2.913	-0.970	0.334	-8.527	2.894
Tp4	-3.731	3.304	-1.130	0.259	-10.207	2.745
Tp5	-1.433	4.084	-0.350	0.726	-9.437	6.572
Tp6	0.997	4.494	0.220	0.824	-7.811	9.806
Tp7	2.311	5.483	0.420	0.673	-8.434	13.057
Tp8	0.387	5.371	0.070	0.943	-10.139	10.913
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(29) = 149.8962				
		p-value = 0.0000				

Table A75 ATT MODEL 2.B.6

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.938	0.727	-1.290	0.197	-2.363	0.487
Post_avg	-1.493	1.447	-1.030	0.302	-4.328	1.342
Tm8	-5.750	3.520	-1.630	0.102	-12.650	1.149
Tm7	0.872	1.487	0.590	0.558	-2.043	3.787
Tm6	-0.781	2.709	-0.290	0.773	-6.091	4.529
Tm5	-2.432	1.761	-1.380	0.167	-5.884	1.020
Tm4	-0.657	1.575	-0.420	0.677	-3.743	2.430
Tm3	1.754	1.133	1.550	0.121	-0.466	3.974
Tm2	-0.440	1.108	-0.400	0.691	-2.611	1.731
Tm1	-0.069	0.929	-0.070	0.941	-1.889	1.751
Tp0	-0.627	0.829	-0.760	0.449	-2.251	0.998
Tp1	-0.640	0.964	-0.660	0.507	-2.529	1.249
Tp2	-0.482	1.106	-0.440	0.663	-2.650	1.686
Tp3	-0.712	1.399	-0.510	0.611	-3.455	2.031
Tp4	-0.275	1.564	-0.180	0.860	-3.341	2.791
Tp5	-2.634	1.848	-1.420	0.154	-6.257	0.989
Tp6	-2.878	2.026	-1.420	0.156	-6.850	1.094
Tp7	-2.265	2.349	-0.960	0.335	-6.870	2.339
Tp8	-2.924	2.935	-1.000	0.319	-8.677	2.829
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(29) = 21.9353				
		p-value = 0.8229				

Table A76 ATT MODEL 2.C.6

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.448	0.685	-0.650	0.513	-1.790	0.894
Post_avg	-2.243	1.682	-1.330	0.182	-5.538	1.053
Tm8	4.996	2.683	1.860	0.063	-0.263	10.254
Tm7	-1.867	3.881	-0.480	0.631	-9.474	5.740
Tm6	-0.069	1.465	-0.050	0.963	-2.940	2.803
Tm5	-4.396	2.079	-2.110	0.034	-8.471	-0.321
Tm4	-1.549	2.317	-0.670	0.504	-6.090	2.992
Tm3	-1.200	1.124	-1.070	0.286	-3.402	1.003
Tm2	-0.129	1.020	-0.130	0.900	-2.127	1.870
Tm1	0.630	0.882	0.720	0.475	-1.098	2.358
Tp0	-0.117	0.763	-0.150	0.878	-1.612	1.378
Tp1	-1.736	1.142	-1.520	0.129	-3.974	0.503
Tp2	-1.917	1.360	-1.410	0.158	-4.583	0.748
Tp3	-1.629	1.603	-1.020	0.309	-4.772	1.513
Tp4	-1.280	1.959	-0.650	0.514	-5.120	2.560
Tp5	-2.742	2.307	-1.190	0.234	-7.263	1.779
Tp6	-3.623	2.429	-1.490	0.136	-8.384	1.137
Tp7	-3.978	2.801	-1.420	0.156	-9.467	1.512
Tp8	-3.160	3.320	-0.950	0.341	-9.668	3.348
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(29) = 62.7575				
		p-value = 0.0003				

Table A77 ATT MODEL 2.D.6

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.657	0.543	-1.210	0.226	-1.720	0.407
Post_avg	0.563	1.729	0.330	0.745	-2.826	3.951
Tm8	-2.010	2.198	-0.910	0.361	-6.318	2.299
Tm7	-2.939	1.947	-1.510	0.131	-6.756	0.877
Tm6	0.385	1.195	0.320	0.748	-1.958	2.727
Tm5	0.961	1.561	0.620	0.538	-2.099	4.020
Tm4	-1.299	1.145	-1.130	0.256	-3.544	0.945
Tm3	1.953	1.259	1.550	0.121	-0.513	4.420
Tm2	-0.399	1.057	-0.380	0.706	-2.471	1.673
Tm1	-1.905	1.040	-1.830	0.067	-3.942	0.133
Tp0	-0.535	0.806	-0.660	0.507	-2.115	1.045
Tp1	0.116	1.270	0.090	0.927	-2.372	2.604
Tp2	1.145	1.505	0.760	0.447	-1.804	4.094
Tp3	2.223	1.700	1.310	0.191	-1.109	5.555
Tp4	2.122	1.926	1.100	0.271	-1.652	5.895
Tp5	-0.163	2.181	-0.070	0.941	-4.438	4.113
Tp6	-0.266	2.516	-0.110	0.916	-5.197	4.664
Tp7	0.050	3.123	0.020	0.987	-6.072	6.172
Tp8	0.374	3.638	0.100	0.918	-6.757	7.504
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(29) = 104.9801				
		p-value = 0.0000				

Table A78 ATT MODEL 2.E.6

	Coefficient	Std.	z	P>z	[95%	conf.
Pre_avg	-0.048	1.006	-0.050	0.962	-2.020	1.924
Post_avg	-1.375	1.902	-0.720	0.470	-5.102	2.352
Tm8	-9.798	5.782	-1.690	0.090	-21.131	1.535
Tm7	7.421	4.205	1.760	0.078	-0.821	15.663
Tm6	1.838	3.050	0.600	0.547	-4.140	7.816
Tm5	-1.212	2.036	-0.600	0.552	-5.203	2.779
Tm4	0.018	2.401	0.010	0.994	-4.689	4.724
Tm3	3.126	2.232	1.400	0.161	-1.250	7.501
Tm2	-1.624	1.633	-0.990	0.320	-4.825	1.576
Tm1	-0.150	1.633	-0.090	0.927	-3.350	3.050
Tp0	-0.396	1.321	-0.300	0.765	-2.985	2.194
Tp1	0.630	1.513	0.420	0.677	-2.337	3.596
Tp2	0.258	1.823	0.140	0.888	-3.315	3.831
Tp3	-1.688	2.156	-0.780	0.434	-5.915	2.538
Tp4	-0.537	2.477	-0.220	0.828	-5.392	4.318
Tp5	-3.609	2.713	-1.330	0.184	-8.927	1.709
Tp6	-3.223	2.919	-1.100	0.270	-8.944	2.498
Tp7	-0.891	3.418	-0.260	0.794	-7.590	5.807
Tp8	-2.921	4.084	-0.720	0.474	-10.925	5.083
		Pretrend Test. H0 All Pre-treatment are equal to 0				
		chi2(29) = 47.4368				
		p-value = 0.0168				

Appendix 37

Figure A16 ATT MODELS 2.A.1 and 2.C.1-2.E.1

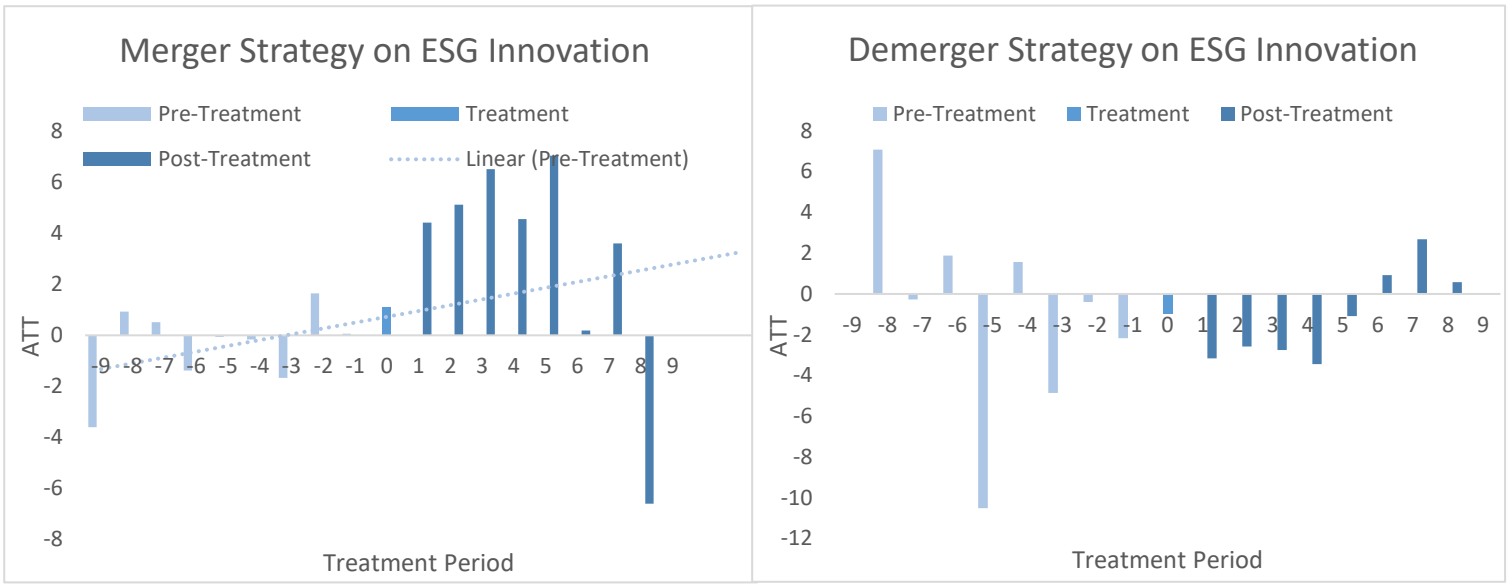


Figure A17 ATT MODELS 2.A.1 and 2.C.1-2.E.1

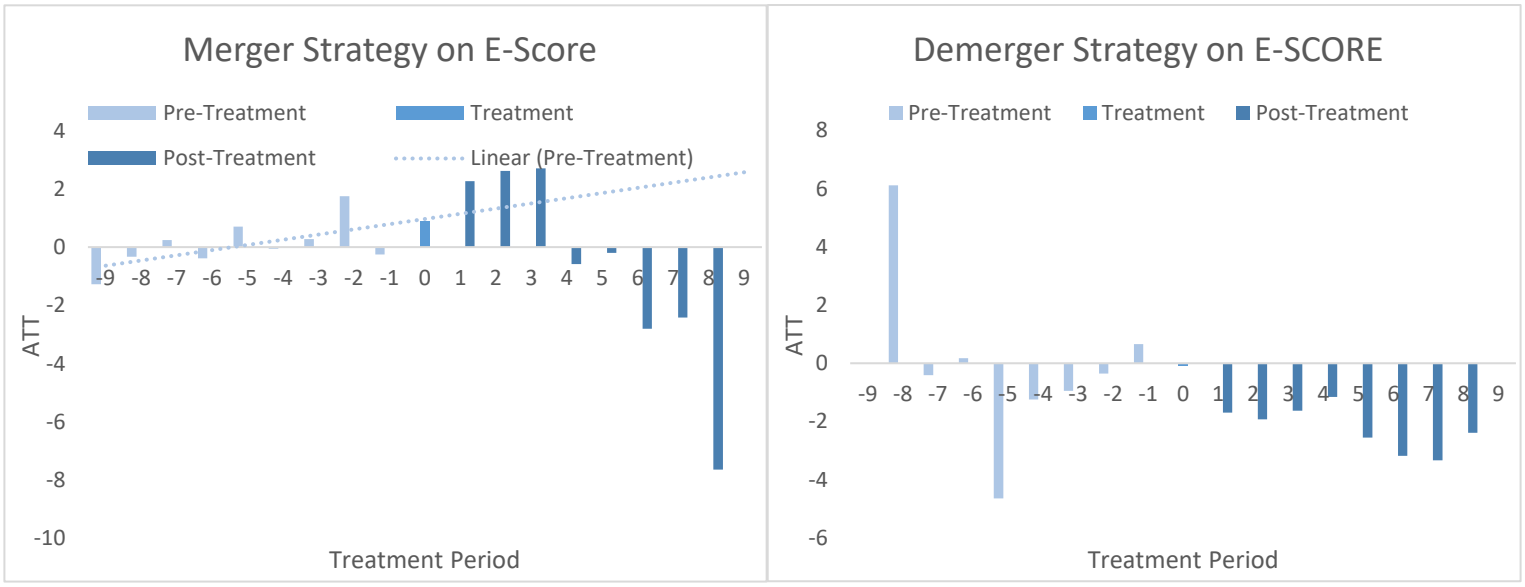
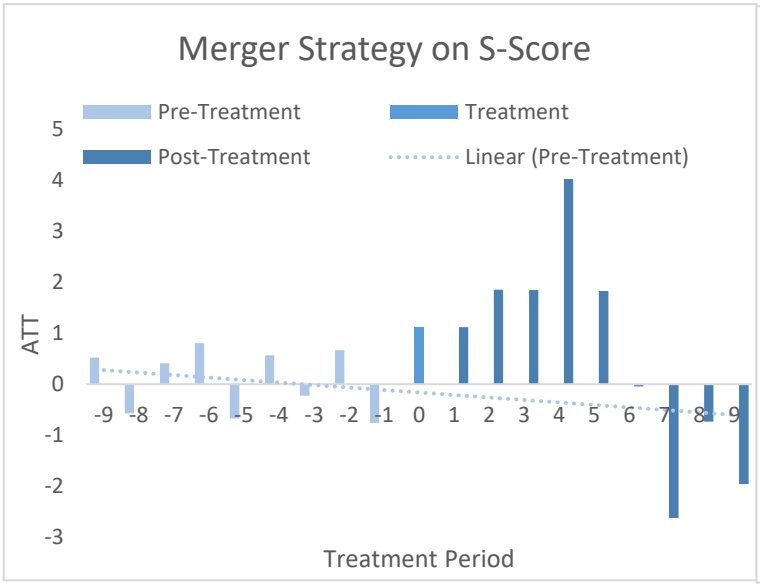


Figure A18 ATT MODELS 2.A.1 and 2.C.1-2.E.1



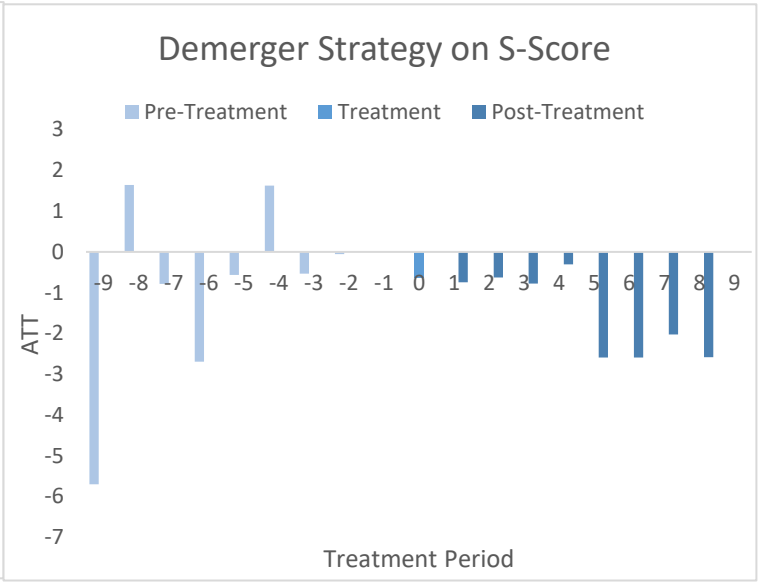
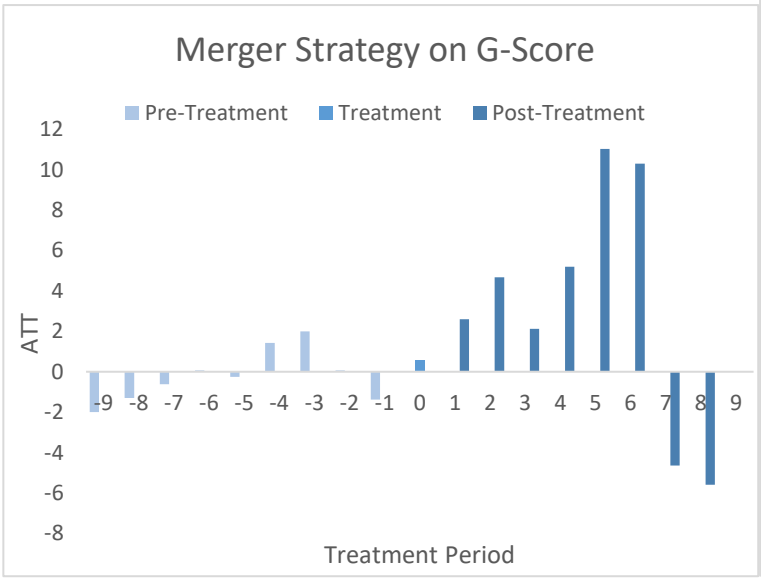
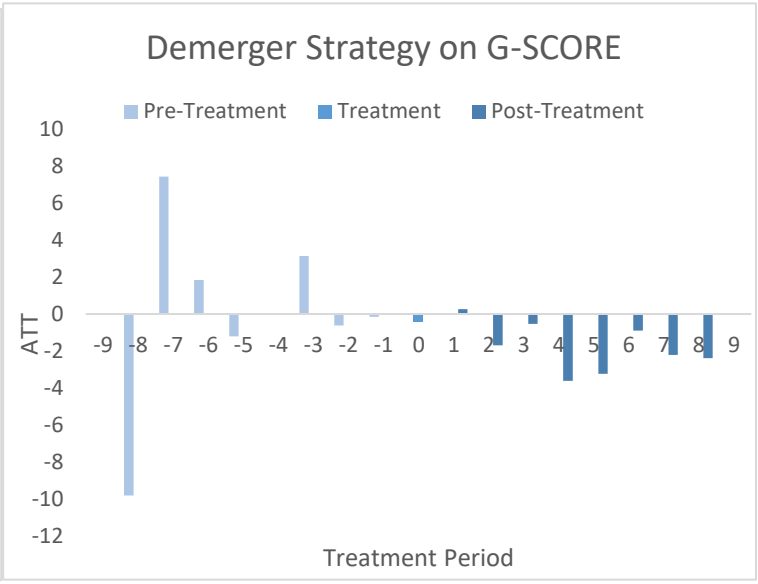


Figure A19 ATT MODELS 2.A.1 and 2.C.1-2.E.1





Appendix 38

Table A79 Quantile Regression of Model 3.B.1

FTE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Q10							
ESG_SCORExMERGER_STR	31.276	6.393	4.89	0	18.74	43.811	***
ESG_SCORExDEMERGER_STR	23.212	9.244	2.51	.012	5.085	41.339	**
RD	1.75e-06	1.19e-07	14.76	0	1.52e-06	1.98e-06	***
PROFIT	.001	.001	2.04	.042	0	.003	**
REVENUE	.001	0	13.82	0	.001	.001	***
CAPEX	-.005	.001	-6.41	0	-.006	-.003	***
FIRM_AGE	.548	.264	2.08	.038	.031	1.065	**
ESG_STRA	-377.101	309.756	-1.22	.224	-984.485	230.282	
Constant	472.055	225.373	2.09	.036	30.135	913.975	**
Q30							
ESG_SCORExMERGER_STR	48.909	12.676	3.86	0	24.053	73.765	***
ESG_SCORExDEMERGER_STR	28.02	10.823	2.59	.01	6.799	49.242	***
RD	1.46e-06	2.44e-07	5.98	0	9.81e-07	1.94e-06	***
PROFIT	0	.001	-0.34	.736	-.003	.002	
REVENUE	.002	0	9.84	0	.002	.002	***
CAPEX	-.006	.001	-4.09	0	-.009	-.003	***
FIRM_AGE	-.062	2.127	-0.03	.977	-4.232	4.108	
ESG_STRA	2.565	428.336	0.01	.995	-837.334	842.465	
Constant	1730.226	343.808	5.03	0	1056.073	2404.378	***
Q50							
ESG_SCORExMERGER_STR	61.27	14.92	4.11	0	32.014	90.525	***
ESG_SCORExDEMERGER_STR	-6.894	10.561	-0.65	.514	-27.603	13.815	
RD	6.91e-07	2.54e-07	2.72	0.007	1.92e-07	1.19e-06	***
PROFIT	0	.001	0.38	.704	-.001	.002	
REVENUE	.003	0	13.87	0	.003	.003	***

CAPEX	-.005	.001	-4.28	0	-.008	-.003	***
FIRM_AGE	2.897	3.806	0.76	.447	-4.567	10.361	
ESG_STRA	-466.103	543.359	-0.86	.391	-1531.545	599.339	
Constant	2265.001	604.765	3.75	0	1079.151	3450.851	***
Q70							
ESG_SCORExMERGER_STR	94.709	27.842	3.40	.001	40.116	149.303	***
ESG_SCORExDEMERGER_STRRD	-3.064	8.939	-0.34	.732	-20.593	14.465	
PROFIT	1.54e-07	2.41e-07	0.64	0.522	-3.18e-07	6.26e-07	
REVENUE	-.001	.001	-1.53	.127	-.003	0	
CAPEX	.004	0	30.97	0	.004	.005	***
FIRM_AGE	-.009	.001	-9.68	0	-.011	-.007	***
ESG_STRA	-1.23	1.807	-0.68	.496	-4.773	2.312	
Constant	60.404	667.296	0.09	.928	-1248.06	1368.867	
Q90	3056.199	745.588	4.10	0	1594.218	4518.179	***
ESG_SCORExMERGER_STR	220.463	59.755	3.69	0	103.292	337.634	***
ESG_SCORExDEMERGER_STRRD	-30.405	34.88	-0.87	.383	-98.8	37.989	
PROFIT	-9.28e-07	3.52e-07	-2.63	0.009	-1.62e-06	-2.37e-07	***
REVENUE	-.001	.001	-1.40	.162	-.003	0	
CAPEX	.005	0	27.44	0	.005	.006	***
FIRM_AGE	-.013	.002	-8.30	0	-.016	-.01	***
ESG_STRA	-8.622	1.222	-7.06	0	-11.018	-6.226	***
Constant	-885.458	2080.495	-0.43	.67	-4964.982	3194.066	
	13663.615	1819.587	7.51	0	10095.691	17231.539	***

Mean dependent var	48555.188	SD dependent var	71117.708

**** p<.01, ** p<.05, * p<.1*

Appendix 39

Table A80 Quantile of FTE Regressions of MODEL 3.B.2

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	4.196	1.461	2.87	.004	1.331	7.308	
DEMERGER_STR	1.544	1.466	1.05	.292	-1.331	3.917	**
RD	4.17e-10	9.79e-11	4.26	0	2.25e-10	6.10e-10	
PROFIT	2.04e-07	1.43e-07	1.43	0.153	-7.61e-08	4.85e-07	
REVENUE	1.29e-07	2.20e-08	5.87	0	8.58e-08	1.72e-07	
CAPEX	-5.62e-07	1.90e-07	-2.96	0.003	-9.34e-07	-1.90e-07	
FIRM_AGE	-.001	.002	-0.88	.382	-.005	-.062	**
ESG_STRA	10.468	.817	12.81	0	8.866	.	
5 Quantiles of FTE						.115	
2	6.263	1.096	5.71	0	4.114	.325	***
3	6.678	1.136	5.88	0	4.451	.556	**
4	9.82	1.338	7.34	0	7.196	2.059	***
5	11.469	1.504	7.62	0	8.519	6.03	***
Quantile_FTE * MERGER_STR							
2	-4.017	1.953	-2.06	.04	-7.847	2	
3	-3.835	1.886	-2.03	.042	-7.533	-.31	**
4	-2.784	1.971	-1.41	.158	-6.649	.009	***
5	-.052	2.151	-0.02	.981	-4.27	13.346	***
Quantile_FTE * DEMERGER_STR							
2	-1.611	2.104	-0.77	.444	-5.736	.106	
3	1.171	1.906	0.61	.539	-2.567	.079	
4	2.192	1.97	1.11	.266	-1.671		
5	-1.147	2.146	-0.53	.593	-5.355		
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	34.058	2.788	12.22	0	28.592	39.524	
Mean dependent var	62.369	SD dependent var	16.286				
R-squared	0.468	Number of obs	2709				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	21242.274	Bayesian crit. (BIC)	21673.291				

** p<.01, ** p<.05, * p<.1

Table A81 Quantile of logFTE Regressions of MODEL 3.B.3

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	3.647	1.926	1.89	.059	-.132	7.425	*
DEMERGER_STR	-.479	1.954	-0.24	.807	-4.311	3.354	
5 quantiles of logFTE							
2	4.158	1.72	2.42	.016	.784	7.531	**
3	1.006	2.113	0.48	.634	-3.139	5.152	
4	4.813	2.681	1.80	.073	-.446	10.071	*
5	4.788	3.305	1.45	.148	-1.694	11.271	
Quantile_logFTE * MERGER_STR							
2	-5.878	2.498	-2.35	.019	-10.777	-.979	**
3	-2.385	2.373	-1.01	.315	-7.039	2.269	
4	-2.694	2.367	-1.14	.255	-7.338	1.949	
5	-1.707	2.488	-0.69	.493	-6.587	3.173	
Quantile_logFTE * DEMERGER_STR							
2	.093	2.812	0.03	.974	-5.423	5.609	
3	3.49	2.376	1.47	.142	-1.171	8.151	
4	-.641	1.915	-0.33	.738	-4.395	3.114	
5	3.17	2.499	1.27	.205	-1.732	8.073	
logRD	1.467	.245	5.99	0	.986	1.948	***
logPROFIT	.441	.414	1.07	.287	-.371	1.252	
logREVENUE	4.754	.736	6.46	0	3.311	6.198	***
logCAPEX	.512	.5	1.03	.305	-.468	1.492	
logFTE	-2.998	.888	-3.38	.001	-4.74	-1.257	***
FIRM_AGE	.005	.002	3.08	.002	.002	.008	***
ESG_STRA	10.984	1.006	10.92	0	9.012	12.957	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-47.363	8.705	-5.44	0	-64.436	-30.289	***
Mean dependent var	64.335	SD dependent var	15.959				
R-squared	0.524	Number of obs	1702				
F-test	43.273	Prob > F	0.000				
Akaike crit. (AIC)	13137.050	Bayesian crit. (BIC)	13523.259				

** p<.01, ** p<.05, * p<.1

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Table A82 Quantile of ASSETS Regressions of MODEL 3.B.4

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	1.324	1.419	0.93	.351	-1.459	4.107	
DEMERGER_STR	.269	1.541	0.17	.861	-2.752	3.291	
RD	3.80e-10	9.53e-11	3.99	0.000	1.93e-10	5.67e-10	***
PROFIT	6.53e-08	1.42e-07	0.46	0.645	-2.13e-07	3.43e-07	
REVENUE	1.33e-07	2.26e-08	5.89	0.000	8.89e-08	1.78e-07	***
CAPEX	-6.21e-08	1.71e-07	-0.36	0.717	-3.98e-07	2.74e-07	
FIRM_AGE	-.004	.002	-2.36	.018	-.008	-.001	**
ESG_STRA	10.5	.81	12.97	0	8.912	12.088	***
5 quantiles of ASSETS							
2	3.869	1.053	3.68	0	1.805	5.933	***
3	5.443	1.156	4.71	0	3.176	7.709	***
4	12.828	1.198	10.70	0	10.478	15.178	***
5	8.846	1.445	6.12	0	6.013	11.679	***
Quantile_ASSETS * MERGER_STR							
2	-2.523	1.906	-1.32	.186	-6.26	1.213	
3	2.479	1.894	1.31	.191	-1.234	6.193	
4	-.641	1.915	-0.33	.738	-4.395	3.114	
5	2.147	1.978	1.09	.278	-1.731	6.024	
Quantile_ASSETS * DEMERGER_STR							
2	2.013	2.05	0.98	.326	-2.007	6.032	
3	1.646	1.966	0.84	.402	-2.208	5.501	
4	1.493	2.001	0.75	.456	-2.43	5.416	
5	2.09	2.053	1.02	.309	-1.935	6.115	
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	35.777	2.824	12.67	0	30.24	41.315	***
Mean dependent var	64.335	SD dependent var	15.959				
R-squared	0.524	Number of obs	1702				
F-test	43.273	Prob > F	0.000				
Akaike crit. (AIC)	13137.050	Bayesian crit. (BIC)	13523.259				

** p<.01, ** p<.05, * p<.1

Table A83 Quantile of logASSETS Regressions of MODEL 3.B.5

ESG_SCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
MERGER_STR	-.064	1.662	-0.04	.969	-3.323	3.196	
DEMERGER_STR	-.933	1.964	-0.47	.635	-4.786	2.92	
5 quantiles of logASSETS							
2	-.457	1.439	-0.32	.751	-3.279	2.365	
3	-1.832	1.68	-1.09	.276	-5.128	1.464	
4	3.729	1.913	1.95	.052	-.024	7.482	*
5	-.631	2.388	-0.26	.792	-5.314	4.052	
Quantile_log * MERGER_STR							
2	-1.341	2.271	-0.59	.555	-5.796	3.114	
3	4.094	2.263	1.81	.071	-.345	8.533	*
4	-1.386	2.197	-0.63	.528	-5.695	2.924	
5	3.087	2.202	1.40	.161	-1.232	7.405	
Quantile_logASSETS * MERGER_STR		.	.	.	.	.	
2	4.207	2.546	1.65	.099	-.788	9.201	*
3	.562	2.516	0.22	.823	-4.373	5.498	
4	3.461	2.431	1.42	.155	-1.309	8.23	
5	1.95	2.45	0.80	.426	-2.855	6.756	
logRD	1.585	.242	6.55	0	1.111	2.06	***
logPROFIT	.299	.432	0.69	.489	-.549	1.148	
logREVENUE	4.9	.784	6.25	0	3.363	6.438	***
logCAPEX	.316	.501	0.63	.529	-.668	1.299	
logFTE	-2.064	.729	-2.83	.005	-3.495	-.634	***
FIRM_AGE	.004	.002	2.18	.03	0	.007	**
ESG_STRA	11.393	1.001	11.39	0	9.43	13.356	***
COUNTRY_D	YES						YES
SECTOR_D	YES						YES
Constant	-55.332	8.284	-6.68	0	-71.58	-39.083	***
Mean dependent var	62.369	SD dependent var	16.286				
R-squared	0.468	Number of obs	2709				
F-test	.	Prob > F	.				
Akaike crit. (AIC)	21242.274	Bayesian crit. (BIC)	21673.291				

** p<.01, ** p<.05, * p<.1

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Table A84 Summary statistics of Quantiles of FTE in FULL_NOASSETS-283

FTE_5	Quantile	N	Mean	Min	Max	SD	p50
1	.1	566	2.476.873	34	5607	1.778.472	2418
2	.3	566	9.383.799	5644	13204	2.146.539	9594.5
3	.5	566	19400.77	13215	27007	3.986.481	18661.5
4	.7	566	46292.41	27015	74018	13543.48	45001
5	.9	566	158582.6	74032	611020	87661.88	128190
Total		2830	47227.28	34	611020	69994.74	18661.5

Table A85 Summary statistics of Quartile (.75) of FTE in FULL_NOASSETS-283

Quartile	Mean	Min	Max	SD	p50
.75	140020.9	56221	611020	86838.05	113830

Appendix 42

Table A86 Summary overview of the thesis results

Hypothesis	Measure	Empirical Method	Model	R2	Conclusion	Overall Conclusion
H1	ESG_INNOV	Pooled OLS	1.A.1	0.391	Rejected	**Not Rejected**
A Mergers Strategy		Pooled OLS	1.A.2	0.396	Rejected	A Merger Strategy is
improves the ESG		Pooled OLS	1.A.3	0.417	Rejected	more effective
Innovation Score more		Staggered	2.A.1 and		Not rejected	
than a Demerger		DiD	2.A.2			
Strategy		Staggered	2.A.3 and		Not rejected	
		DiD	2.A.4			
		Staggered	2.A.5 and		Not rejected	
		DiD	2.A.6			
H2	ESG_SCORE	Pooled OLS	1.B.1	0.351	Rejected	**Not Rejected**
A Mergers Strategy		Pooled OLS	1.B.2	0.526	Rejected	A Merger Strategy is
improves the ESG Score		Pooled OLS	1.B.3	0.396	Not rejected	more effective
more than a Demerger		Staggered	2.B.1 and		Not rejected	
Strategy		DiD	2.B.2			
		Staggered	2.B.3 and		Rejected	
		DiD	2.B.3			
		Staggered	2.B.5 and		Not rejected	
		DID	2.B.6			
H3	E_SCORE	Pooled OLS	1.C.1	0.526	Rejected	
A Mergers Strategy		Pooled OLS	1.C.2	0.494	Rejected	**Not Rejected**
improves the		Pooled OLS	1.C.3	0.524	Rejected	A Merger Strategy is
Environmental		Staggered	2.C.1 and		Not rejected	more effective
component of the ESG		DiD	2.C.2			
Score more than a		Staggered	2.C.3and		Rejected	
Demerger Strategy		DiD	2.C.4			
		Staggered	2.C.5and		Not rejected	
		DiD	2.C.6			
H4	S_SCORE	Pooled OLS	1.D.1	0.526	Not rejected	**Not Rejected**
A Demergers Strategy		Pooled OLS	1.D.2	0.441	Not rejected	A Demerger
improves the ESG		Pooled OLS	1.D.3	0.475	Rejected	Strategy is more
Score's Social		Staggered	2.D.1 and		Rejected	effective
component more than a		DiD	2.D.2			
Merger Strategy		Staggered	2.D.3and		Not rejected	
		DiD	2.D.4			
		Staggered	2.D.5 and		Not rejected	
		DiD	2.D.6			
	G_SCORE	Pooled OLS	1.E.1	0.233	Not rejected	
H5						
A Demergers Strategy		Pooled OLS	1.E.2	0.239	Not rejected	**Rejected**
improves the		Pooled OLS	1.E.3	0.324	Rejected	A Merger Strategy is
Governance component		Staggered	2.E.1 and		Rejected	more effective
of the ESG Score more		DiD	2.E.2			
than a Merger Strategy		Staggered	2.E.3 and		Rejected	
		DiD	2.E.4			
		Staggered	2.E.5 and		Rejected	
		DiD	2.E.6			